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Message from the Minister of **Natural Resources**

I am pleased to present to Canadians and to Parliament *The State of Canada's Forests: Annual Report 2014*. By any measure, Canada is a forest nation. As Canada's Minister for Natural Resources and Minister for the Federal Economic Development Initiative for Northern Ontario, I know very well how important forestry is to the economy of Northern Ontario and to our nation. Across Canada, working families rely on the forest for the good jobs and the environmental benefits they provide. This is why Canadians take seriously our responsibility to future generations to ensure this incredible resource will support all the values we place up on it.

This year's report

Canadians can be proud of their commitment to science-based sustainable forest management. As in previous editions, this year's report provides detailed information on Canada's forest resources and management. By making this report available to Canadians and to the world, we are demonstrating that our forest practices are responsible and transparent. Canada's forest lands include over 150 million hectares of forest land certified by third parties as being sustainably managed—41% of the world's certified forests. Further, Canada harvests less than 0.5% of its forest resource each year, and all forests harvested on public lands must be regenerated. This is an enviable record.

The State of Canada's Forests contains several new features this year. The sustainability indicators have been reorganized to discuss six key questions about Canada's forests. A new map of Canada's forests provides context for the information in the report, with key facts also illustrated in an infographic. Finally, a feature article describes how remote sensing innovations are revolutionizing forest monitoring and improving forest management practices.

A new sense of optimism

The report's summary of activities and accomplishments over the past year reflects new opportunities and the growing sense of optimism in the sector. While the industry is showing strong signs of growth in some segments —lumber in particular—it is challenged by market trends in other areas. Nonetheless, the recovery pace in 2013 allowed the industry to post some of the highest revenues in many years.

This is good news for workers and communities that depend on forests across Canada. Given that the forest sector is particularly active in rural parts of the country, often close to and around First Nations communities, there are more and more opportunities for Aboriginal peoples to participate in, and benefit from, the forest economy.

Our commitment to transformation

The Government of Canada has invested $1.8 billion in the transformation of the forest industry since 2006. These investments are important because they help the industry diversify, add new revenue streams, reduce costs and enter new markets. They also support the development and commercialization of new products such as biocomposites, renewable energy and nano-materials.

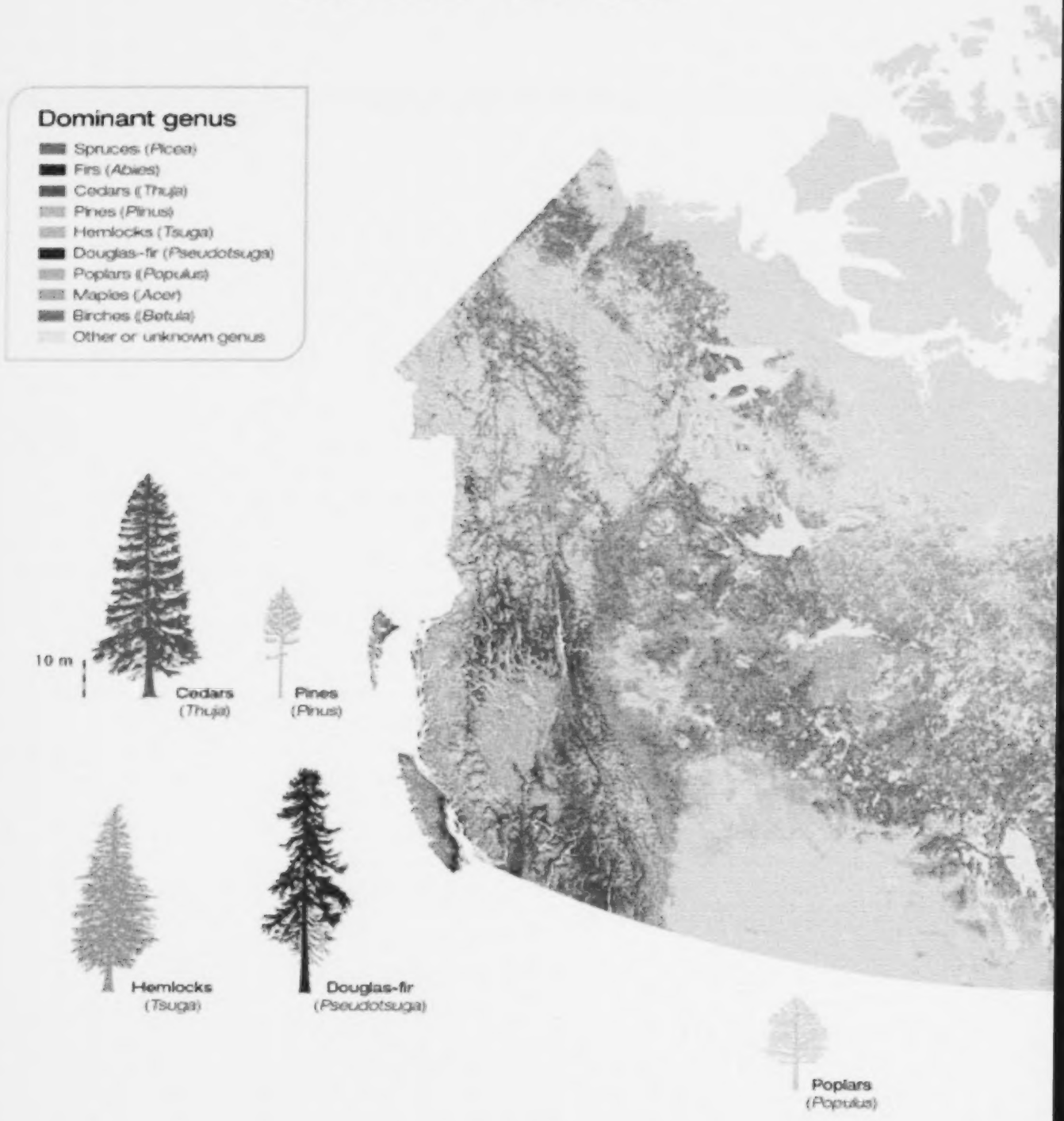
Economic Action Plan 2014 renewed the Government of Canada's commitment to the Investments in Forest Industry Transformation program, which supports the commercialization of advanced technologies and high-value products in Canada's forest sector. This unique program helps Canadian companies move great ideas and revolutionary products from laboratories into the marketplace, ensuring that Canada's industry is at the forefront of the transformation to higher-value manufacturing. Examples of these new products can be found in the year in review section of this report.

Economic Action Plan 2014 also provided support for science aimed at ensuring a healthy source of timber for the forest sector. For example, with the spruce budworm outbreak in eastern Canada now spreading in Quebec and putting New Brunswick forests at risk, our government has provided funding to investigate various early intervention measures. Our goal is to limit the economic impact of this native insect and protect the jobs of workers who depend on the forest.

I trust you will find *The State of Canada's Forests* interesting and informative. I believe that Canada is achieving a balance between the economic, environmental and social needs of today, while ensuring that future generations will continue to enjoy the many benefits of our forests.

The Honourable Greg Rickford, P.C., M.P.
Canada's Minister of Natural Resources and
Minister for the Federal Economic Development
Initiative for Northern Ontario

Forest composition
across Canada

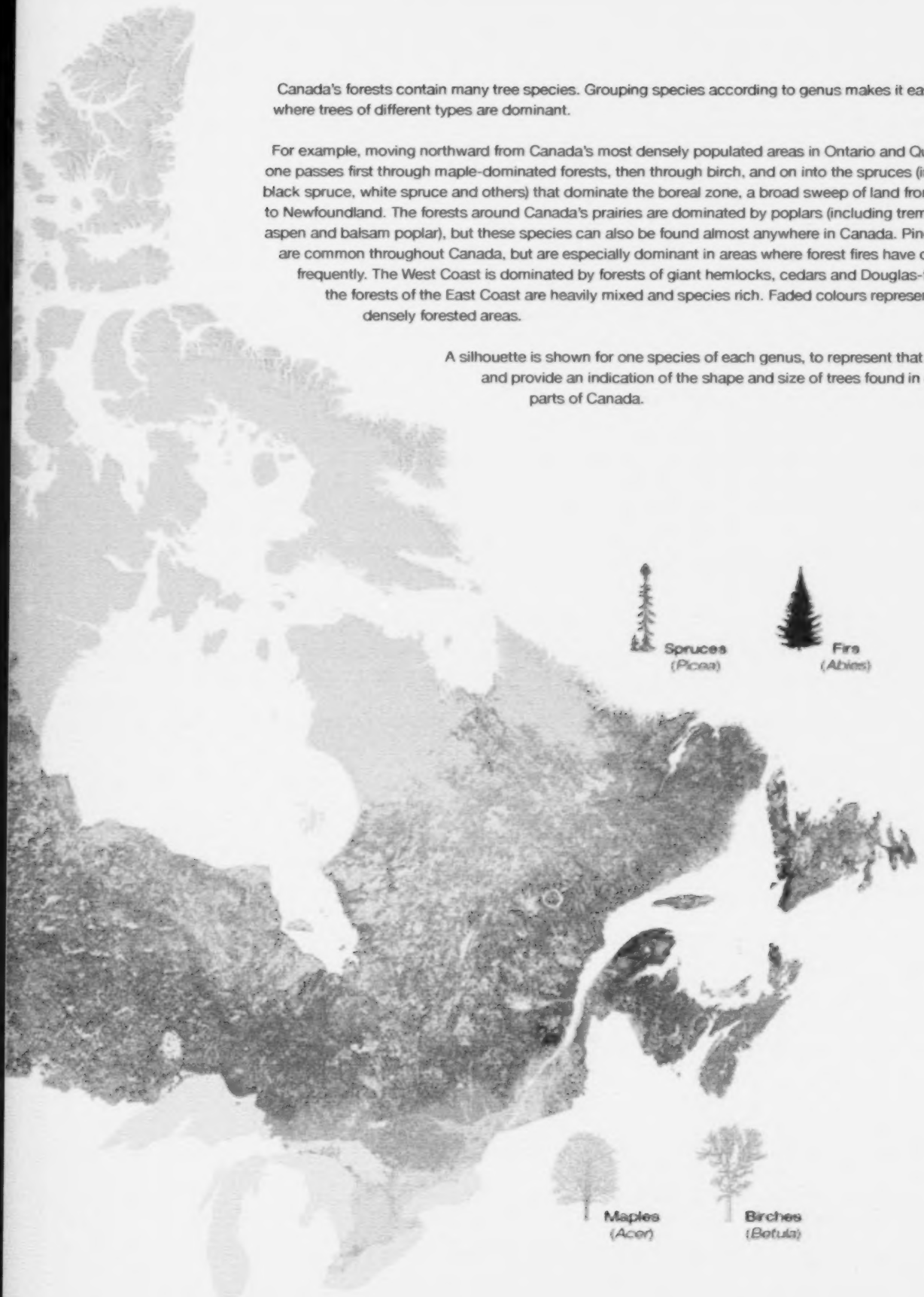


Sources: Beaudoin, A., Bernier, P. Y., Guindon, L., Villemaire, P., Guo, X. J., Stinson, G., Bergeron, T., Magnussen, S., and Hall, R. J. 2014. Mapping attributes of Canada's forests at moderate resolution through kNN and MODIS imagery. *Canadian Journal of Forest Research*. DOI : 10.1139/cjfr-2013-0401; Canada's National Forest Inventory; Silhouettes reproduced from *Trees in Canada* by J. L. Farrar, 1995.

Canada's forests contain many tree species. Grouping species according to genus makes it easier to see where trees of different types are dominant.

For example, moving northward from Canada's most densely populated areas in Ontario and Quebec, one passes first through maple-dominated forests, then through birch, and on into the spruces (including black spruce, white spruce and others) that dominate the boreal zone, a broad sweep of land from Yukon to Newfoundland. The forests around Canada's prairies are dominated by poplars (including trembling aspen and balsam poplar), but these species can also be found almost anywhere in Canada. Pines, too, are common throughout Canada, but are especially dominant in areas where forest fires have occurred frequently. The West Coast is dominated by forests of giant hemlocks, cedars and Douglas-firs, whereas the forests of the East Coast are heavily mixed and species rich. Faded colours represent less densely forested areas.

A silhouette is shown for one species of each genus, to represent that genus and provide an indication of the shape and size of trees found in different parts of Canada.



Canada's forests: **Key facts**

The contribution of Canada's forests to the country's economy, environment and social well-being is significant. Our forests form an important part of our roots as a nation and a big part of our future.

Canada has

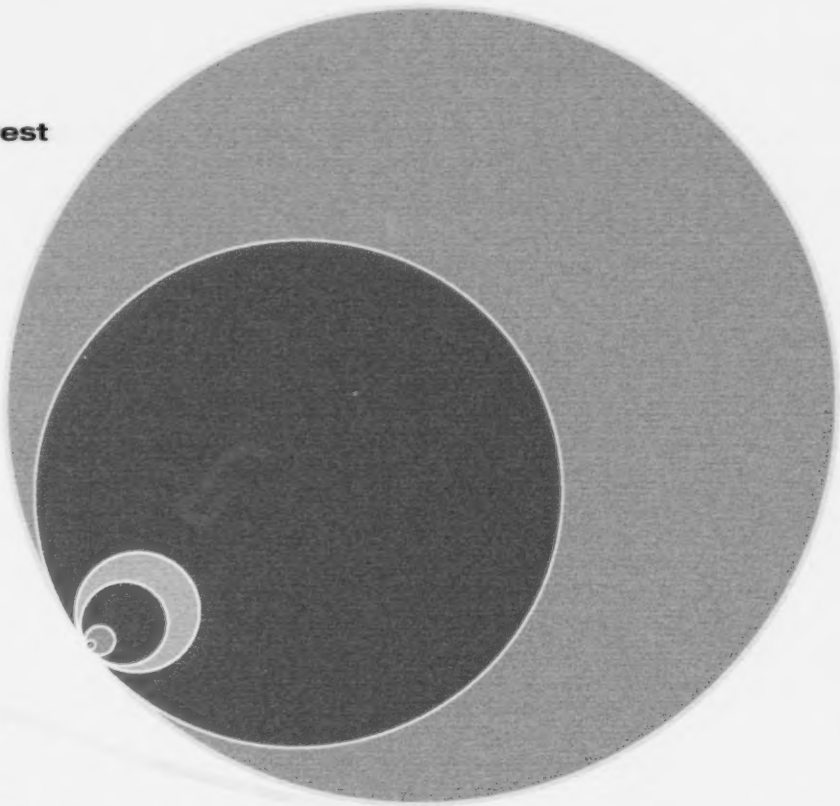
348 **million hectares of forest**

153 million hectares of forest **independently-certified as sustainably managed**

8.6 million hectares of forest **damaged by insects in 2012**

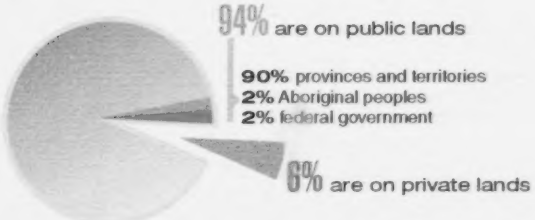
4.2 million hectares of forest **burned in forest fires in 2013**

0.6 million hectares of forest **harvested in 2012**



0.05 million hectares of forest **deforested in 2012**

Forest ownership



By law, **all forests harvested** on public lands must be regenerated.

What is deforestation?

Deforestation is the clearing of forests to make way for new, non-forest land uses, such as urban development or agriculture. Land that temporarily has no trees is still considered to be a forest when the trees are expected to grow back—like after fires or harvesting.

Forest benefits

About 70%
of Aboriginal communities are located in forested areas

In 2013, the forest industry's contribution to Canada's GDP was
$19.8 billion

216,500 people
were directly employed in the forest industry in 2013

in tree cover in an urban area can have the effect of cooling that area by 1° Celsius

More than 65%
of Canadians get their water from river systems, lakes and reservoirs—sources that largely originate in forested areas

About 2/3
of Canada's plants, animals and micro-organisms live in the forest

Canada's forests represent

9%
of the world's forests

24%
of the world's boreal forests

2013: The year **in review**

In many ways, 2013 was a year of change for the Canadian forest sector, with key developments in response to both successes and challenges.

Changing demands

The forest industry ended the year in a strong position, with Canada's top 10 largest public forest companies posting their highest operating revenues in 10 years. This was due in large part to the recovery of U.S. markets and a continued demand for lumber and solid wood products from China. However, the pulp and paper sector continued to face challenges created by the long-term decline in consumer demand for the paper used to produce newspapers, magazines and flyers resulting from the rise of electronic media.

These positive and negative pressures have motivated firms to make large strategic investments in new products and processes, to aggressively pursue merger and acquisition opportunities, and to diversify their markets. The Canadian forest industry is reinventing itself to adapt to the new business environment.

Renewing the Investments in Forest Industry Transformation program

The Government of Canada's Budget 2014 renewed the highly successful Investments in Forest Industry Transformation (IFIT) program of Natural Resources Canada, committing to an additional $90.4 million in funding over four years. The program was launched in 2010 to help move new technologies out of the laboratory and into the commercial mainstream, through targeted investments in deployment and commercialization. In this way, the program is supporting Canada's forest sector in becoming more economically competitive and environmentally sustainable.

By the end of 2013, the IFIT program had funded 14 projects, eight of which were world-first technologies, generating at least 10 new Canadian patents. For example:

- In a global first, Kruger Biomaterials Inc., in Trois-Rivières, Quebec, installed new technology to produce cellulose filaments. This breakthrough biomaterial has tremendous potential. With its unique strengthening properties, it can be added to a wide range of commercial pulp and paper products, such as tissue, paper towel and packaging. Cellulose filaments can also be used in many non-traditional applications—for example, as a reinforcing agent for plastics and composites.
- In a Canadian first, Millar Western Forest Products will generate green energy at its Whitecourt, Alberta, pulp mill by integrating an anaerobic effluent processing plant at the facility. This new technology has the potential to be used at other mills across Canada, to produce energy from a waste stream.

Once completed, the 14 projects funded by the first round of IFIT investments will generate about 75 new jobs and secure 2,500 others. In addition, the projects will reduce greenhouse gas emissions by 60 kilotonnes a year and increase Canada's green electricity capacity by 7.2 megawatts.

The renewal of IFIT in 2014 will help bring the next wave of innovation to market, solidifying Canada's position as a leader in the ongoing transformation of the global forest sector.

Expanding markets

Market diversification is a key part of the forest sector's ongoing recovery. Exports of Canadian wood products to China and South Korea have increased significantly since 2002—32-fold and 3-fold, respectively. In 2013, softwood lumber exports to China grew by over 30% from the previous year as a result of ongoing promotion of Canadian wood products and technical support for wood-frame construction.

In North America, the Expanding Market Opportunities program continues to promote the greater use of wood in non-residential and mid-rise buildings. This work has contributed to more than 1,600 conversions of projects to wood since 2007, with a direct wood sale value of about $660 million. Research and testing supported by the program have also led to changes in the 2015 edition of the *National Building Code of Canada*, which will ease size and height restrictions for wood-frame buildings from four storeys to six.

Providing new opportunities for Aboriginal communities

Aboriginal communities across Canada are benefiting from new economic development opportunities as a result of tenure modernization and new forest management agreements. *Tenure* is the system that governs who is allowed to harvest timber on provincial Crown lands.

Ontario is modernizing its tenure system so that a wider group of people has access to its forest resources. Previously, only forest companies were licensed to harvest timber. The new tenure system will increase the involvement of communities and Aboriginal people in the management of local forests. Up to 60 eligible First Nations are expected to participate in the tenure reform process, which will enable them to play a greater role in Ontario's forest sector. The modernized system will also create new opportunities for entrepreneurs and businesses in Ontario's forest sector.

In the Northwest Territories, the Ministry of Environment and Natural Resources signed a forest management agreement with Timberworks Inc.—the first agreement of its kind in the territory. Established by the Deninu K'ue First Nation and the Fort Resolution Métis Council, Timberworks will have rights to harvest from Crown lands in prescribed areas for sustainable business development for the next 25 years. The agreement will provide the residents of Fort Resolution with business, employment and training opportunities in the forest industry.

Canadian Council of Forest Ministers

The Canadian Council of Forest Ministers (CCFM) brings together federal, provincial and territorial ministries responsible for forests to advance their shared priorities.

The ministers met in early 2014 in Calgary, Alberta—their first meeting since 2010—to chart a path forward. At the conclusion of the meeting, the ministers emphasized their commitment to supporting innovation and Aboriginal participation in the forest sector. The event also highlighted the successful completion of work by the CCFM's Climate Change Task Force. Through its six years of research, collaboration and outreach, the task force developed a unique body of work that provides insight and guidance for forest sector stakeholders attempting to manage and adapt to the impacts of climate change on current and future operations.

The 2014 CCFM meeting created an important forum for building collaborative relationships and driving progress on key issues, while enabling the CCFM to renew its relevance in the Canadian forest sector.

Strengthening Canada's stature in boreal science

In 2013, researchers from Natural Resources Canada–Canadian Forest Service (NRCan–CFS) produced a series of 12 papers synthesizing the available scientific research on the impacts of human development, resource use and climate change on Canada's boreal zone. The papers will inform future forest research needs and policy discussions. All of the papers will be publicly available by the end of 2015.

Also in 2013, the Government of Canada co-hosted an International Boreal Forest Research Association Conference, *Boreal Forests at Risk: From Boreal Science to Public Policy*, with the University of Alberta. Additional sponsorship came from other organizations connected to the world's boreal zone, including the International Union of Forest Research Organizations. The conference, which brought together the world's leading experts in this field, was instrumental in advancing science-based solutions to the risks faced by boreal forests. About 230 representatives from 11 countries participated, including a number of NRCan–CFS researchers who presented their boreal zone synthesis papers to this international audience.

Helping forests that are under pressure from pests

In 2013, outbreaks of three insect pests continued to have an impact on Canada's forests.

The emerald ash borer, a non-native invasive species, is causing devastating levels of ash tree mortality throughout Ontario and Quebec. Early detection programs have identified new infestations in both provinces. Infestations typically cause about 99% mortality in ash trees within five years of detection. Despite aggressive attempts at management, populations continue to increase and spread. Research is underway to further improve early detection tools that use female-produced pheromones (scents). In an attempt to control the spread, biological control approaches—using native and non-native diseases and parasitic insects—are also being evaluated.

An outbreak of eastern spruce budworm, a native insect, continued to grow on Quebec's North Shore, spreading to the South Shore as well and putting New Brunswick at risk. Potential early intervention strategies for outbreaks of this insect are being evaluated in Quebec and New Brunswick based on a new model of population growth that suggests that outbreaks spread from localized, high-budworm-density "epicentres." The early intervention approach is aimed at minimizing the risk and extent of epidemics through intensive monitoring and rapid control of these emerging population epicentres.

And although mountain pine beetle populations are waning in British Columbia, the native insect is expanding its geographic and host range. The beetle is now established in forests in northern Alberta and threatens to spread east across Canada's boreal forest if conditions are favourable. Research into the ecology and population dynamics of the beetle as it moves east and north is being used in an ongoing risk analysis to assist forest managers in finding effective mitigation and adaptation options.

NRCan–CFS, industry, academic, and provincial and territorial researchers are working together to better understand these insects and, ultimately, to find ways to reduce the spread and impact of outbreaks.

Looking ahead

Canada will continue to push ahead with programs that promote and support the creation of new markets and sophisticated, high-value-added products and technologies. Innovation and science will support the health and well-being of our forests and the communities and industries that depend on them.

How remote sensing innovations are revolutionizing forest monitoring and **management in Canada**

Today, nearly every industry, service sector and other area of activity is well into a "data revolution."

The ways data are being collected, channelled and applied are profoundly affecting how everyone, from individuals to governments and businesses, gets information and uses it. Technologies that once rested in the realm of science fiction—like satellite data instantaneously beamed to Earth, mapped and ready to read on hand-held phones and dashboard displays—are now mainstream.

Canada's forest sector is taking advantage of these radical developments and contributing its own innovations.

With new remote sensing technologies, massive amounts of data are being collected more quickly and consistently than ever before imagined. Sophisticated sensors mounted on satellites, planes, helicopters and even drones have made data collection over Canada's vast and dynamic forests not only more efficient and cost-effective, but more comprehensive. In turn, equally innovative processing and analysis technologies are transforming these data into highly detailed maps, images and other forms of visual display.

In the Information Age, this technology-fuelled data revolution has also made it easier for everyone—not just foresters, scientists and technicians—to watch over Canada's forests. That's a good thing. More information, backed with on-the-ground knowledge, helps support better forest monitoring, better prediction making, and better management decision making. And the more we are learning, the more we are seeing opportunities for optimizing and increasing the many benefits that forests provide Canadians.

The importance of tracking how and why forests change

Forests are always changing, and keeping a close eye on the changes underway in Canada is a fundamental part of this country's commitment to forest stewardship and sustainable forest management.

Collecting information at regular intervals—about the extent of forest cover, species composition, disturbances, forest health and other factors—gives analysts a means of identifying trends and patterns of change, and of understanding the reasons for and implications of those changes. This access to greater knowledge is enhancing forest management in so many ways. Our ability to predict coming changes is improved, and therefore so is our capacity to make ever better-informed operational decisions on the ground.

Remote sensing and data processing: Powerful tools in the forest monitoring kit

Remote sensing, the art and science of observing things from afar, is not new. Foresters, like other resource managers, have long used aircraft (like planes and helicopters) to get pictures of landscapes from above. Over the years, however, technological innovation has substantially expanded and refined the tools available for foresters to use. Remote sensing via satellite is standard practice now.

Careful interpretation: Essential to making sense of monitoring data

Have these remote sensing advances made ground- and air-based data collection technologies unnecessary? Not at all. It's one thing to observe changes in forest cover. It's another to understand what those changes really indicate and why they are taking place. Even high-resolution images of the quality now being produced from satellite data cannot by themselves explain what is being shown. Interpreting the images accurately requires "boots on the ground" to verify what those "eyes in the sky" are seeing. It takes scientific and technical expertise about forest ecosystems, natural processes and local conditions to accurately interpret the data.

This is certainly the case with monitoring rates of deforestation, a matter of global concern. While forest cover loss may be apparent from satellite imagery, knowledgeable interpretation is required to truly understand how and why that loss occurred. Not all forest cover loss means there is deforestation (meaning permanent change of forests to new, non-forest land uses).

Only by distinguishing between natural- and human-caused change, understanding the nature of the disturbance observed, and knowing forest recovery rates can analysts make reasonable assessments of deforestation rates in any region. It is through such assessments, for example, that analysts know that Canada's annual deforestation rates have been declining for the past two decades. Today, less than 0.02% of Canada's forest lands are deforested each year.

Better data are enabling better-informed and more effective policy-making

At the global level, satellite data are helping forest analysts more accurately characterize changes in forest cover, assess how forest cover changes are affecting ecosystem services (such as water filtering), and quantify rates of deforestation and afforestation. For example, such data are being used across Canada to:

- Monitor wildfire occurrence and spread:
  - Real-time tracking of daily fire activity is being used in wildfire management programs, plans and prediction software in support of fire suppression decision making.
  - Detailed mapping of burned areas is being used to analyze fire impacts.

- Monitor forest cover type and forest cover extent:
  - Forest cover data from the National Forest Inventory are being combined with satellite data to produce detailed national maps of forest attributes such as volume, species and height.
  - Information is being used in research to study the effects of climate change on forests and to develop predictions.

Canadian scientists are also collaborating with others around the world to develop new data products (such as mapping programs and interpretive applications) to help monitor forests globally. At the same time, researchers in Canada are developing approaches specific to the study of forests in this country. For instance, international scientific teams are developing global maps of forest cover change. Canadian scientists are developing more detailed maps and using these to study why the changes observed by global monitoring programs have occurred.

The view ahead: Improving our ability to predict changes in forest cover

The more that is understood about how and why Canada's forests are changing, the better prepared researchers and forest managers will be in adapting to all the other changes going on: in the forest products Canada turns out, in the global market demand for those products, and in the public expectations about what constitutes good forest stewardship.

In so many ways, the new data-strengthened tools in use are significantly enhancing the day-to-day experience of forest management, and not just as applied to forest cover monitoring.

Multiple databases used together offer tremendous potential for numerous aspects of forest resource planning and management. For example, integrated systems are already in use for predicting fire-fighting resource demands. The approach draws on a combination of hefty databases: weather, forest cover, terrain, fire behaviour and more. The result—a full-scope situational snapshot—offers managers substantial support in making sound, time-sensitive deployment decisions about fire-fighting equipment and personnel resources.

Many more applications of the data being gathered by remote sensing are also now being developed. In the future, for instance, it is hoped that forest pest infestation and host tree distribution mapping will enable early detection of pests and prediction of potential outbreaks and likely patterns of spread.

With the data revolution underway in the forest sector, it's also an exciting time for resource managers, scientists and others committed to the responsible development of this country's valuable and extensive forest resources—resources vital in both the national interest and the global interest.

Forest composition across Canada

The map *Forest composition across Canada* on pages 4 and 5 of this report was produced by using satellite-based technology. In this case, NRCan–CFS combined information from the National Forest Inventory with imagery collected by the MODIS instrument aboard NASA's Terra satellite.

Satellite imaging has proven to be especially valuable in monitoring Canada's large, remote boreal forests, where traditional ground- and air-based approaches are impractical and prohibitively expensive.

Sustainability indicators

Canada's forests are renewable resources and rich, resilient ecosystems. They offer significant environmental benefits, many opportunities for responsible economic development, and innumerable values that contribute to the quality of life of all Canadians.

Because of the importance of Canada's forests, they need to be carefully monitored to ensure any challenges to their health are addressed. The many demands placed on these forests also need to be balanced in a holistic way so Canadians can benefit from their many—ecological, economic and social—functions. Sustainability indicators are helpful tools to provide an overall picture.

What are sustainability indicators?

Sustainability indicators are science-based measures that give government, industry, researchers and the public a way to consistently define, assess, monitor and report progress on sustainable forest management.

At the national level, Canada has established a set of 46 indicators, developed through broad public consultation. They reflect the full range of forest values that Canadians want conserved or managed sustainably. In this way, the indicators characterize the key components of sustainable forest management. They are also consistent with internationally-supported indicators of forest sustainability.

Sustainability indicators are beneficial in several ways. They:

- provide essential information for use in discussions about the state of Canada's forests
- help identify where forest management practices and policies can be improved
- clearly demonstrate Canada's environmental credentials

This year's selection of indicators

For this year's *State of Canada's Forests* report, a selection of the 46 indicators is presented, chosen based on their relevance and practicality and on data availability and currency. This year, the indicators have been organized to address key questions about forests and forestry in Canada.

These indicators provide a clear picture of the interactions between forests and society, and of the status and trends of the main forest functions. They also show the successful results of more than 20 years of committed work in sustainably managing the country's forests. Canadians can feel confident that their forests are continuing to provide a broad range of benefits even though economic, environmental and social circumstances are constantly changing. Similarly, Canada's trading partners can feel confident that the Canadian forest products delivered to them come with strong environmental credentials from sustainably managed sources.

Sources and information for the sustainability indicators are provided starting on page 52.

How much forest does Canada have?

Canada has 348 million hectares of forest land. This represents 9% of the world's forests and 24% of the world's boreal forests. Forests dominate the Canadian landscape almost everywhere except the Arctic and the Prairies. In the boreal zone, a person could walk all the way from Yukon to the Atlantic coast under a canopy of spruce.

Forest area, wood volume, deforestation and afforestation are basic indicators of sustainable forest management.

Provinces, territories and the federal government collaborate to monitor changes in Canada's forest area and wood volume. Monitoring is done on the ground, from the air and from space. Forest measurements and observations are made on an ongoing basis to inform sustainable forest management decision making and public policy development, and to provide data for scientific research.

In many countries, forests are under enormous development pressure from agriculture. In Canada, however, most forests grow in areas that are remote, sparsely populated and not well-suited to agriculture. Most are also publicly owned: about 90% are managed by the provinces and territories.

Not all of Canada's forests are highly productive. In many regions, particularly in the boreal zone, forests grow very slowly. Nevertheless, they still provide important services such as water and air purification and habitat that supports native plant and animal biodiversity. The productive commercial forests provide all these values too, as well as wood fibre that is harvested at sustainable rates to meet social and economic needs and generate wealth for Canada as a whole.

The provinces and territories monitor regeneration and wood volume growth in the forest areas they manage, collaborating with the federal government in this and many other aspects of sustainable forest management.

What is a forest?

The United Nations' Food and Agriculture Organization (FAO) defines *forest land* as an area where the tree canopy covers more than 10% of the total area and the trees, when mature, can grow to a height of more than 5 metres. It does not include land that is predominantly urban or used for agricultural purposes.

Following the FAO definition of *forest land* makes it easier for Canada to report internationally on its forests and enables comparisons to be made with other countries.

Land that temporarily has no trees is still considered to be a forest when the disturbance is known to be temporary and trees are expected to grow back soon (e.g., after harvesting). This is in contrast to:

- *deforestation* – the clearing of forests to make way for new, non-forest land uses
- *afforestation* – the planting of forests on lands that were previously non-forest lands.

Naturally caused additions and removals of tree cover (e.g., from fire or pests) are considered neither deforestation nor afforestation.

Source: See *Sources and information* for more details.

Indicator: Forest area

What has changed and why?

Across Canada's 348 million hectares of forest land, forest disturbances occur from time to time, mostly as a result of natural events such as fires and insect outbreaks. These events do not affect forest area, unless for some reason the trees are not able to grow back. For thousands of years, Canada's forests have regularly been disturbed, yet trees continue to grow back naturally.

Land use change is also always going on, but only about 0.02% of Canada's forest area is lost each year through deforestation. Even so, deforestation is closely monitored to ensure that causes and impacts are well understood. Government policies promote sustainable forest management, which includes maintaining forest area.

What is the outlook?

The overall forest area in Canada is expected to remain generally stable. However, some shifts resulting from a changing climate—such as the northward migration of the northern tree line and the loss of aspen along the southern edge of the boreal forest—may lead to changes in forest area distribution across the country over the long term. Changes to Canada's forests are being monitored by provincial and territorial governments in collaboration with the federal government.

Forested areas in Canada

Forests dominate the Canadian landscape almost everywhere except the Arctic and the Prairies. National Forest Inventory data have been used in combination with satellite data to produce this map of treed areas in Canada. The most darkly shaded green areas show the most densely tree-covered areas.

Source: Canada's National Forest Inventory.
See *Sources and information* for more detail.

Indicator: Wood volume

What has changed and why?

The total wood volume in Canada's forests is about 47 billion cubic metres (m^3).

In forest areas managed for wood production, foresters closely monitor tree growth and wood volume increment to determine sustainable harvest levels and make management plans. The overall sustainable harvest level currently determined for Canada is 227 million m^3 per year.

Most of Canada's forests are relatively slow growing, but some are highly productive. Tree growth rates are determined by climate, local site conditions, tree health, tree age and tree genetics. These tree growth variations lead to big differences in standing volumes at sites across Canada:

- Canada's fastest-growing and oldest trees are found in the Pacific Maritime ecozone. There, the average wood volume is 432 m^3 per hectare, more than triple the national average of 136 m^3 per hectare.
- Canada's slowest-growing forests are found in the Taiga Shield ecozone (with an average wood volume of 61 m^3 per hectare) and the Hudson Plains ecozone (36 m^3 per hectare).

What is the outlook?

Wood volume is expected to stay relatively unchanged as both harvesting and natural disturbances (such as fire and insect infestations) continue to be offset by forest regeneration and growth.

Total wood volume in Canada by species group

Species group	Total wood volume (billion m^3)
Spruce	22.4
Poplar	6.2
Pine	5.6
Fir	3.5
Hemlock	2.7
Douglas-fir	1.7
Birch	1.6
Maple	1.4
Others	2.3
Total	**47.3**

Numbers may not add up due to rounding.

Source: Canada's National Forest Inventory. See *Sources and information* for more detail.

Indicator: Deforestation and afforestation

What has changed and why?

Over the last two decades in Canada, the annual rate of deforestation has declined, dropping from 64,000 hectares deforested in 1990 to about 46,000 hectares deforested in 2010. Two spikes in this trend occurred when hydroelectric reservoir development in Quebec resulted in forest areas being submerged: 35,000 hectares in the mid-1990s and another 28,000 hectares in the mid-2000s.

Since 1990, about 0.33% of Canada's total forest area has been converted to other land uses (including agriculture and urban development).

Urban and rural afforestation planting initiatives are underway in many regions of Canada, but the land areas involved in recent years have been very small relative to the total forest area in the country.

Deforestation is the clearing of forests to make way for new, non-forest land uses.

Afforestation is the planting of forests on lands that were previously non-forest lands.

What is the outlook?

Deforestation and afforestation will be affected by local and global socio-economic factors. However, the overall rate of deforestation in Canada is expected to decline further over time. Conversion of forest to agricultural land uses will remain the largest cause of deforestation in Canada, although deforestation from activity in western Canada's oil and gas sector is currently increasing.

Estimated area of deforestation in Canada, by industrial sector, 1990–2010

Sector	Deforestation area (hectares) by year				
	1990	1995	2000	2005	2010
Agriculture	42,100	22,200	20,500	19,100	18,900
Forestry*	3,700	3,300	3,600	3,800	3,800
Hydroelectric	2,700	1,500	900	1,100	600
Industry and transportation					
Industry	900	900	900	900	900
Mining	2,800	2,700	2,900	2,700	2,500
Oil and gas	4,400	5,400	7,900	11,300	11,100
Transportation	2,000	1,700	3,000	2,800	2,700
Municipal	3,900	3,700	4,300	4,700	4,700
Peat mining	900	700	500	100	100
Recreation	600	700	700	600	600
Total	**64,000**	**42,600**	**45,000**	**47,200**	**45,900**

* Forestry numbers result from the creation of permanent forestry access roads.

Numbers may not add up due to rounding.

Source: Environment Canada, *National Inventory Report 1990–2012: Greenhouse Gas Sources and Sinks in Canada*. See *Sources and information* for more details.

How much timber is harvested, and is harvesting done sustainably?

In 2012, 148 million cubic metres (m^3) of industrial roundwood were harvested in Canada. That represents approximately 0.3% of Canada's total standing wood volume (47 billion m^3).

Harvesting and the regeneration practices that go along with it are at the heart of Canada's sustainable forest management regime. In tandem, they are among the most important human-controlled interventions in our forests. Natural disturbances annually affect a much larger area of Canada's forests than do the human-controlled interventions of harvesting and regeneration.

The vast majority of harvesting occurs under provincial jurisdiction. In 2012, 86% of the total volume of industrial roundwood harvested in Canada originated from provincial Crown lands. Provincial governments regulate harvest levels on provincial Crown lands by specifying the annual level of harvest allowed on a particular area of Crown land over a set number of years. This is called the annual allowable cut (AAC).

In many years, actual harvest levels are well below the AAC level because of market conditions or business decisions. No AAC is determined for Canada as a whole, but it is possible to compare the combined provincial AACs across the country with the timber harvest totals from the same land base.

Under provincial laws, all areas harvested on provincial Crown lands are required to be regenerated using natural or artificial means (i.e., planting and seeding), or a mix of the two. Successful regeneration of harvest areas ensures that forest lands remain productive for wood fibre and continue to provide key ecosystem services such as storing carbon, regulating water quality and quantity, and providing wildlife habitat and recreation opportunities. Standards and regulations for achieving successful regeneration vary by province, but commonly address: species composition; density and distribution; age and height of the regenerating trees; and distribution of various forest types and age classes across the landscape.

Less than half of harvested areas in Canada regenerate naturally. Natural regeneration offers many benefits. It needs little human assistance; it creates a solid foundation for ecosystem-based management; and it generally costs less than artificial regeneration. Artificial regeneration, on the other hand, increases the likelihood of achieving regeneration to planned future forest species compositions. It also provides more control of density and stocking levels. With natural regeneration, control over species composition is difficult, and thinning or fill planting may be needed to ensure density and stocking meet regeneration standards.

Indicator: Area harvested

What has changed and why?

In 2012, the area of Canada's forest that was commercially harvested declined by 12% from the year before—a fall to 594,000 hectares from the 675,000 hectares harvested in 2011.

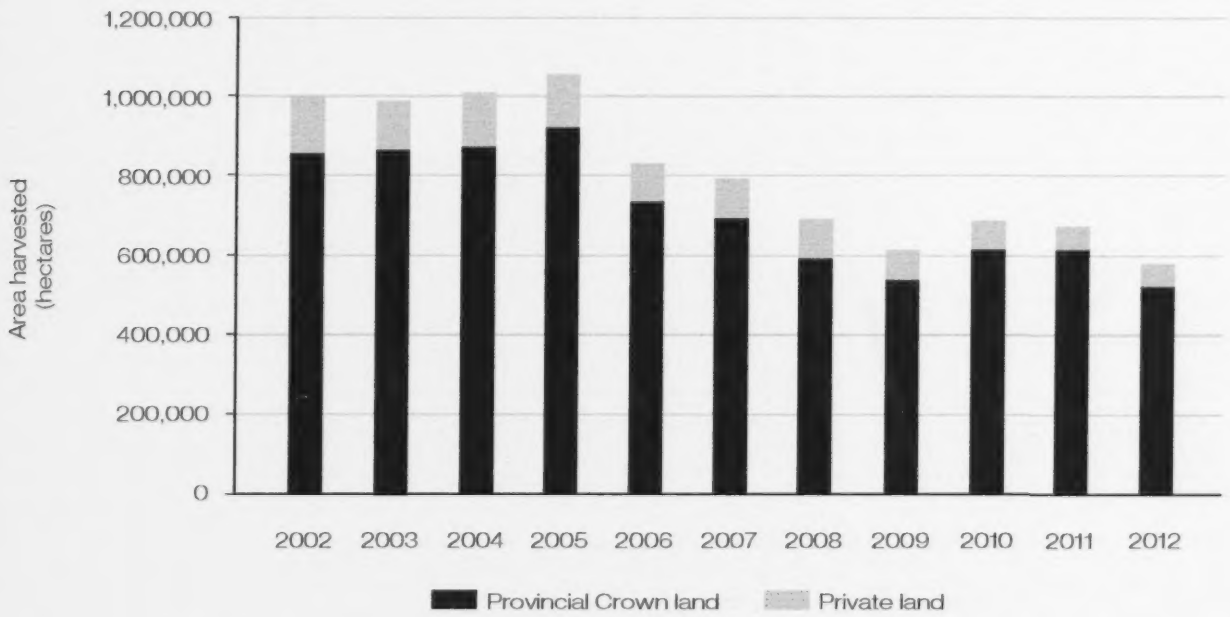
The area harvested in Canada started declining in 2006, largely because of a decline in general newsprint demand, a decline in U.S. lumber demand for housing, and the global economic downturn. Since then, despite a recovery in demand for lumber in the U.S. and improving global economic conditions, harvest levels have not gone back up: 2012 was the lowest level of harvest in decades.

The area harvested each year represents less than 0.5% of Canada's 348 million hectares of forest land. It is also a significantly smaller area than the amount of area disturbed each year by natural causes such as fire and insects.

What is the outlook?

Generally speaking, the area harvested correlates with demand for forest products. Therefore, given the ongoing global economic recovery, the area harvested can be expected to increase over the near term, though likely not rising above pre-2005 levels. Even if it did reach its 2005 peak, the area of Canada's forest land harvested each year is still expected to remain small compared with the area disturbed by fire, insects and disease.

Forest area harvested on private and provincial Crown lands in Canada, 2002-2012



Source: National Forestry Database. See *Sources and information* for more detail.

Indicator: Regeneration

What has changed and why?

Natural regeneration is the most efficient approach to regeneration for many forest types and silvicultural systems. However, artificial regeneration, achieved through planting and seeding, remains an important part of forest management. Artificial regeneration is often prescribed to ensure that specific targets for species composition, stocking and density are met and achieved in a timely manner.

Rates for artificial regeneration are closely tied to harvest rates on provincial Crown lands, which is where most harvesting occurs and where successful regeneration is required. However, changes in the regeneration trend tend to lag behind changes in the harvest trend because of the time required for planning, site preparation and the acquisition of nursery stock.

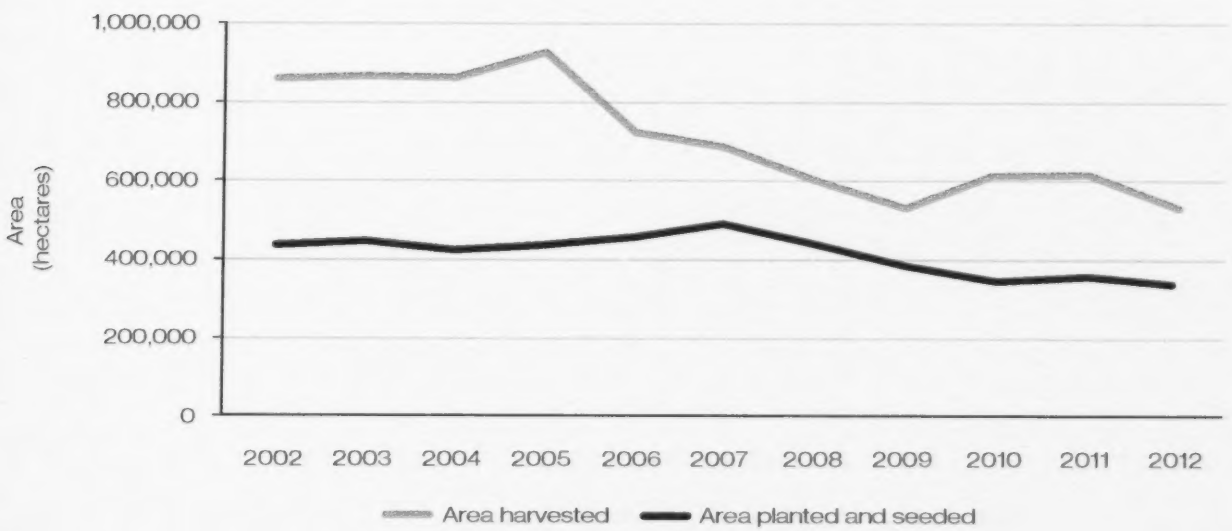
With the decline in harvest levels that has been underway since 2005 in Canada, the area of harvested lands artificially regenerated has also declined. In 2012, the area artificially regenerated fell to a new 20-year low, 19% below the 10-year average. While the amount of area regenerated in British Columbia increased, that was more than offset by decreases in Quebec. The area artificially regenerated stayed relatively stable in all of the other provinces.

As a percentage of total area harvested in Canada, total area regenerated by artificial means has remained fairly stable over the last decade, accounting for slightly more than half of all area harvested.

What is the outlook?

With export markets improving for many Canadian wood products, harvest levels are expected to continue to rebound from recent 20-year lows. With that, the area artificially regenerated through planting and seeding is also expected to rise again.

Area harvested and planted and seeded on provincial Crown lands in Canada, 2002-2012



Source: National Forestry Database. See *Sources and information* for more detail.

Indicator: Volume harvested relative to the sustainable wood supply

What has changed and why?

Canada's estimated sustainable wood supply declined slightly between 2011 and 2012, falling by 1.5%, from 230 million to 227 million cubic metres (m^3).

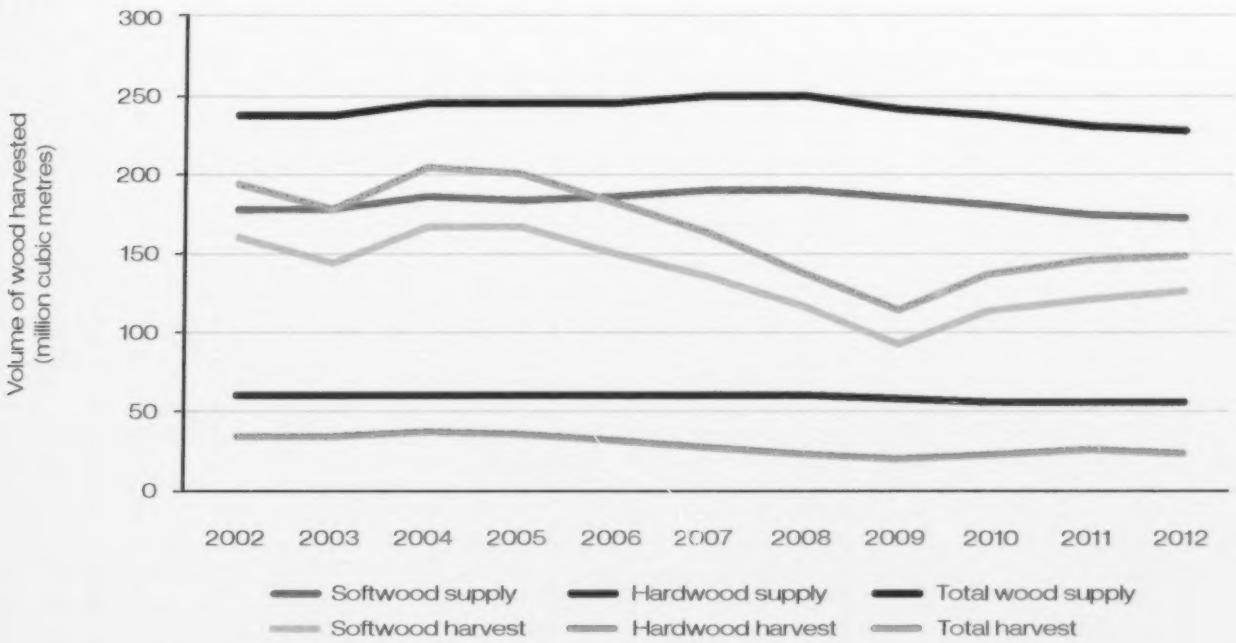
At the same time, the total volume of timber harvested from all jurisdictions (provincial Crown, territorial, private and federal lands) rose slightly, from 146 million m^3 in 2011 to 148 million m^3 in 2012—well below the level of harvest deemed to be sustainable.

What is the outlook?

Given the strong regulatory regimes in place across Canada, harvest levels are expected to remain below the estimated sustainable wood supply. In the medium term, the gap between the volume harvested and the volume deemed to be sustainable can be expected to continue to narrow slowly as:

- the demand for solid wood building products in the U.S. returns; and
- reductions in available wood supply occur largely as a result of the effects of the mountain pine beetle outbreak in British Columbia and policy changes in several central Canadian provinces.

Annual harvest versus supply deemed sustainable for harvest, 2002–2012



Source: National Forestry Database. See *Sources and information* for more detail.

How does disturbance shape Canada's forests?

Canada's forests are influenced by a range of natural disturbances that vary in severity, extent and frequency. Natural disturbances have occurred in Canada's forests for thousands of years, shaping everything from forest aspect, composition and structure to the diversity of plants and animals that inhabit Canada's forest ecosystems. Fire, insects, disease, drought, wind throw and floods all affect the forest on an ongoing basis. In the forest, nothing is ever static.

Human-caused forest disturbances include harvesting, deliberate flooding, and mining and other resource extraction activities. While harvesting has an impact on Canada's forests, it is still a fraction of the impact of natural disturbances. Over time, forest management practices and regulations have evolved, aimed at better managing landscape-level changes while accounting for the presence of natural disturbances.

Large natural disturbances are of special concern because of their impact on both forests and society. Forest fires, for example, although a natural part of many of Canada's forest ecosystems, can reduce the availability of timber for harvest and can put the safety and health of communities at risk. Their costs to society in terms of timber loss and control activities can also run into the millions of dollars yearly.

Severe insect outbreaks are relatively uncommon but may affect extensive areas of forest as they progress over time. Their impact on communities may also be large by disrupting timber supplies and imposing expensive control costs. Non-native invasive species and diseases pose unique risks to our forests because of their uncertain ecological and socio-economic impacts.

Forest disturbances can also have a major effect on the environmental carbon balance. Forests are a vital part of the carbon cycle, storing and releasing this element in a dynamic process of growth, decay, disturbance and renewal. Forest carbon emissions and removals vary considerably from year to year, mostly because of the number of wildfires and their extent. Severe insect outbreaks can also have a large, although more gradual, impact on forest carbon emissions. In contrast, forest harvesting generally results in the storage of some of the forest carbon in long-lasting wood products (e.g., wood in houses). These products reduce emissions when used as construction substitutes for products such as concrete, which take more energy to make.

Indicator: Forest diseases

What has changed and why?

In managed forests, forest diseases can be detrimental to stand productivity, largely by affecting the rate of growth of the forest.

Some native forest diseases are already widespread, such as Armillaria root disease, which affects about 203 million hectares of forest with varying intensity. However, the geographic distribution and host range of other forest diseases are expanding. For example, the foliar (leaf) disease Dothistroma needle blight is starting to have economic consequences in the forest sector in northern Alberta and northern British Columbia.

Non-native diseases are continuing to cause damage in managed and unmanaged forests. White pine blister rust has caused extensive mortality in eastern and western white pine populations since its establishment in the early 1900s. Now the disease is also a major threat to the survival of limber pine and whitebark pine in the Rocky Mountains. Annosus root disease is spreading northward at a rate of 10 kilometres per year. It has been found in jack pine, white pine and red pine, and has the potential to expand into the boreal forest.

The life cycles and spread of forest diseases are closely regulated by climatic conditions and human activities that enable the transport of disease from one area into another. Therefore, when disease expansion into new areas occurs, it suggests that climatic conditions have become suitable for disease development across a broader geographic range.

Lodgepole pine showing signs of defoliation caused by Dothistroma needle blight.

What is the outlook?

As climatic suitability for forest diseases increases through warming or changes in moisture conditions, their geographic range is expected to continue to expand, which will affect trees that were previously free from disease.

Source: See *Sources and information* for more detail.

Indicator: Forest insects

What has changed and why?

In 2012, the most recent year for which complete data are available, 8.6 million hectares of forest were damaged by insects—compared to 9.0 million hectares in 2011.

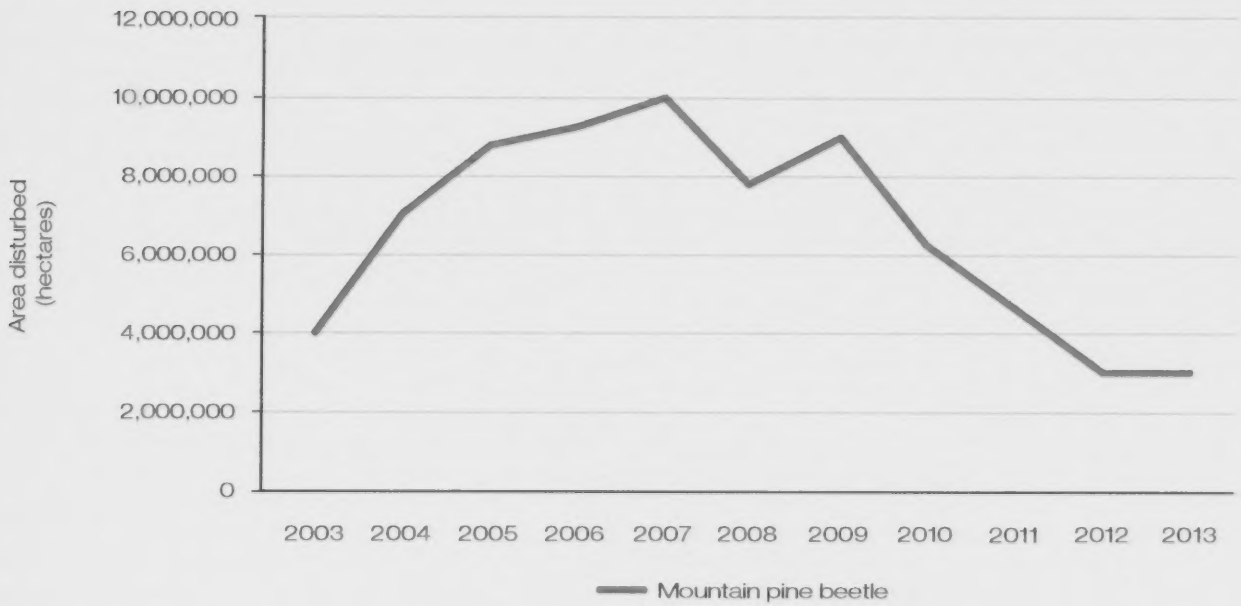
Bark beetles

The area impacted by the mountain pine beetle in British Columbia declined to about 3 million hectares in 2012 as host trees died and there were fewer susceptible trees available for attack. Populations continue to expand the infestation range east of the Rocky Mountains in Alberta and the Northwest Territories, following migrations of beetles from British Columbia in 2006 and 2009 and subsequent spread from these new infestations. Much of this novel range, however, suffers only trace (<1%) levels of tree mortality.

Non-native invasive species

Non-native invasive species such as gypsy moth and emerald ash borer remain a special concern for forest managers because of their novel and uncertain ecological and socio-economic impacts. Non-native species are often pests in urban environments where their impacts are more related to aesthetic, health and community benefits and the cost of control or tree removal rather than to timber values.

Forest area containing mountain pine beetle-killed trees in Canada, 2003–2013



The area disturbed by the mountain pine beetle is for British Columbia only.

Source: British Columbia Ministry of Forests, Lands and Natural Resource Operations. See *Sources and information* for more detail.

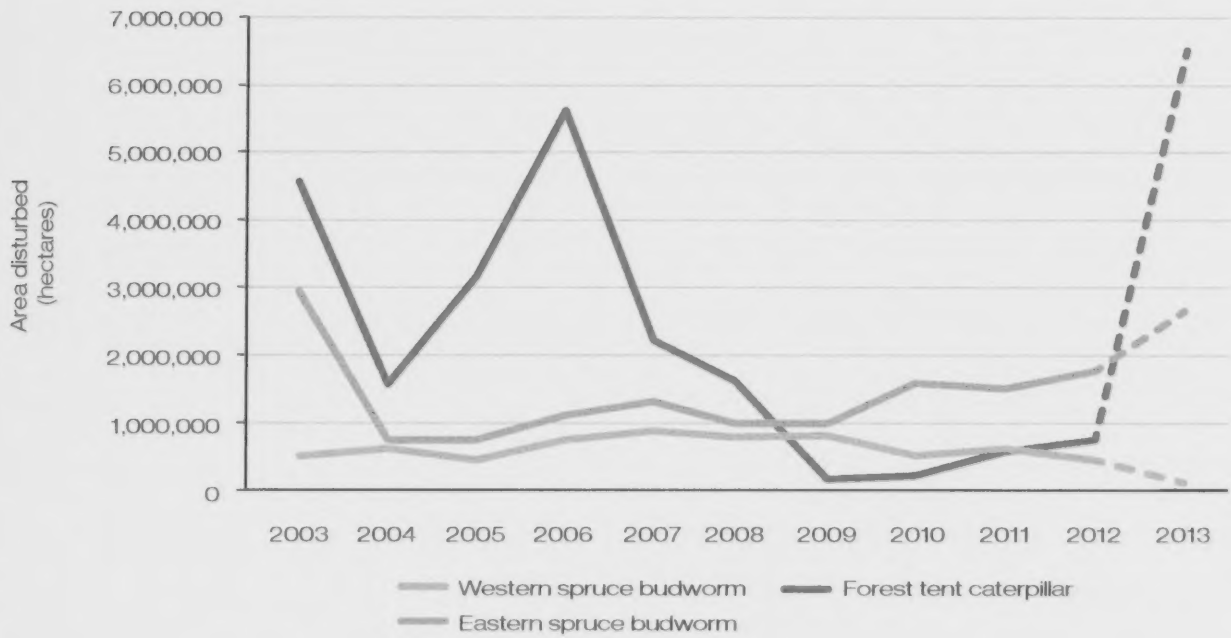
Defoliators

The area of outbreak of western spruce budworm continued to decrease in British Columbia. However, a new outbreak of eastern spruce budworm is gathering momentum in Quebec where the area defoliated increased once more by nearly 50% over the previous year to an estimated 2.7 million hectares in 2013.

The forest tent caterpillar is another native insect defoliator for which populations had been declining since 2006, but are now resurging in aspen forests in Canada west of the Great Lakes.

For spruce budworm and forest tent caterpillars, abundant foliage of their host trees sustains population increases and the resulting defoliation decreases tree growth. If defoliation is severe or persists for several years, tree mortality can occur. The resulting reduction in available food for the insects, in combination with the impacts of natural enemies and diseases contributes to the eventual decline of outbreaks. Additionally, weather can cause unpredictable changes in populations over larger areas. Regional environmental conditions such as drought can worsen the mortality of affected trees and successful regeneration when it occurs with insect infestations.

Forest area containing defoliated trees for three insects in Canada, 2003-2013



The dashed line indicates preliminary data for 2013 that are subject to change.

Source: National Forestry Database. See *Sources and information* for more detail.

What is the outlook?

The area of damage by the mountain pine beetle is now expected to continue to decline in British Columbia as the pest runs out of host trees, but will continue to spread slowly east of the Rocky Mountains where susceptible trees and climate permit.

The eastern spruce budworm outbreak is expected to continue to increase, although areas severely impacted in the last outbreak may be less damaged this time than in the previous outbreak. The area defoliated by forest tent caterpillar could increase eastward.

Indicator: Forest fires

What has changed and why?

In 2013, a total of 6,246 forest fires burned about 4.2 million hectares. This number of fires was about 10% lower than the 10-year average, yet the area burned was almost double the 10-year average. In terms of both numbers of fires and area burned, the busiest months were June, July and August, which is typical for Canada.

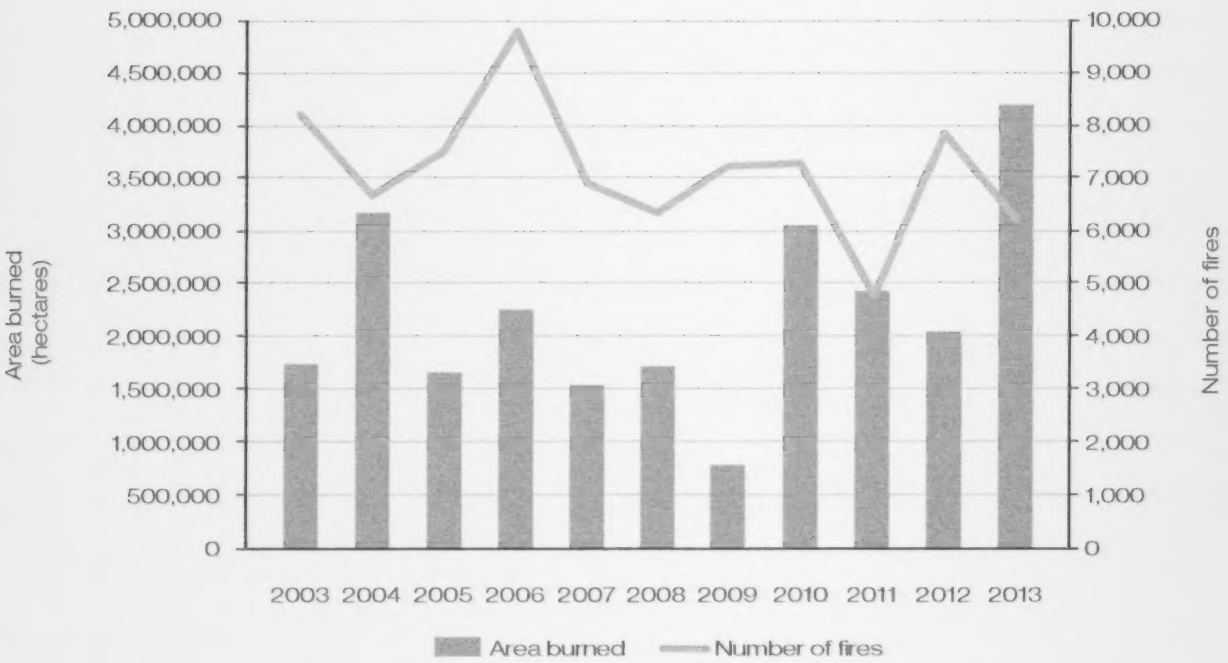
Also in 2013:

- Quebec had an extremely active fire season, with about 1.8 million hectares burned—over 10 times the province's 10-year average.
- Ontario, Alberta, British Columbia and Yukon were significantly below their 10-year averages for area burned.
- Atlantic Canada, Saskatchewan and the Northwest Territories were relatively close to their respective 10-year averages.
- Forest fires resulted in 21 community evacuations, affecting at least 5,900 people. Both figures were slightly below the 10-year average.

What is the outlook?

When and where significant fire activity occurs vary greatly year to year. Analyses of fire trends are starting to show an increase in the annual variability of fire seasons, the number of fires, the amount of area burned, and the length of the fire season. More fire activity is now occurring before and after the peak fire months of June, July and August.

Forest area burned and number of forest fires in Canada, 2003–2013



Sources: National Forestry Database; Canadian Interagency Forest Fire Centre, *2013 Canada Report*. See *Sources and information* for more detail.

Indicator: Carbon emissions and removals

What has changed and why?

The annual carbon balance for Canada's managed forests results from a complex interaction of many factors that affect how much carbon forests release (emit) into the atmosphere and how much they accumulate (remove) from the atmosphere.

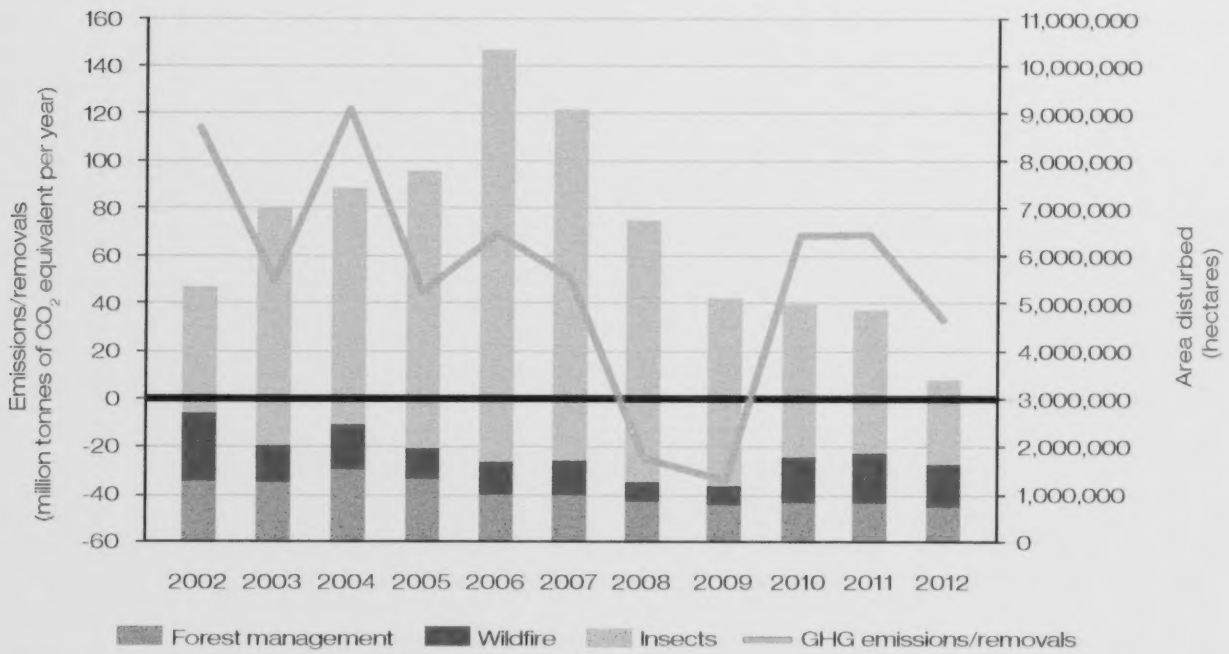
In 2012, Canada's managed forests were a net carbon source, emitting 33 million tonnes (Mt) of carbon dioxide equivalent (CO_2e). At the same time, these forests accumulated 61 Mt of carbon (225 Mt CO_2e) in forest biomass and dead organic matter. Another 34 Mt of carbon (126 Mt CO_2e) were transferred from the forest to the forest products sector (e.g., stored in wood in housing construction).

Canada's managed forests have removed more carbon from the atmosphere than they emitted in 12 of the 23 years from 1990 to 2012. However, it is difficult to discern an overall trend because forest carbon emissions and removals vary considerably from year to year as a result of wildfires and (to a lesser extent) insect epidemics. The year 2012 was a slightly higher-than-average fire year. About 900,000 hectares burned in the managed forest, contributing 124 Mt of CO_2e emissions to the net carbon balance of the country's managed forests.

What is the outlook?

For Canada's managed forests, the annual carbon balance varies greatly from year to year, as the figure shows. The substantial uncertainties associated with predicting the future behaviour of, and interactions between, the many contributing factors make the outlook for this indicator difficult to assess. However, early indications suggest that 2013 may be another year of significant fire-related carbon emissions.

Carbon emissons and removals in Canada's managed forests, 2002–2012



Source: Environment Canada, *National Inventory Report 1990–2012: Greenhouse Gas Sources and Sinks in Canada*. See *Sources and information* for more detail.

Spotlight: Climate change impacts on Canada's forests

Climate change models suggest that the climate of high-latitude forests around the world is changing faster than the global average. Canada's forests and forest sector are likely already subject to diverse consequences of these changes. At the same time, however, attributing individual events to climate change as distinct from natural variability is difficult, and long-term records are needed to enable scientists to separate trends of change from natural variability.

Forest operations are already being impacted by changes in climate. For example, mid-winter thaws are shortening the season for winter harvesting and transport activities. Many areas have also seen forest fire seasons start earlier, with possible increases in fire management costs. Larger rainfall events are forcing operators to increase culvert sizing. Over time, climate change is projected to bring even more changes to forest operations across the country.

It is, however, through disturbances that climate change will have its greatest impacts on all aspects of the forest sector. Natural disturbances such as fires and insect outbreaks are necessary agents of forest renewal, but they also have major impacts on the economies of communities through the cost of lost timber volumes, decreased forest growth and increased protection needs. Fires also affect the safety and health of communities located near forests. Large wind storms are the dominant disturbances in the Maritime provinces and their frequency and levels of damage to forests have been increasing over the past few years.

Climate change is affecting all of these natural disturbances. Forecasts using climate change scenarios suggest that fire activity will increase across much of Canada's forests, as will the potential for pest outbreaks to expand into areas previously climatically unsuitable for certain forest insects and diseases. Similarly, invasive pests from warmer countries brought to Canada through commerce may find increasingly hospitable climates in this country's forests. For wind storms and hurricanes, the direct link to climate change is not as clear, as new research suggests that recent increases in their incidence could be linked to cyclical patterns of Atlantic storm activities.

Monitoring of fires and pests, both native and non-native, is helping foresters improve their understanding of the changes underway and initiate adaptation actions to mitigate the impacts of those changes.

How do forests benefit Canadians?

Forests and the forest industry play a vital role in the well-being of all Canadians, including those who live in cities and those who work in non-forestry occupations.

The most obvious benefits are economic and social. In 2013, the forest industry employed about 320,000 people in direct and indirect employment. In many rural and Aboriginal communities, forest sector employment is especially important.

Today's forest sector is also a dynamic, progressive place to work, offering foresters, scientists, engineers, computer technologists, technicians and skilled tradespeople long-term career opportunities in interesting, well-paid jobs.

Equally significant are the environmental benefits Canadians gain from forests. Trees and other forest plants act as natural cleansers, filtering pollutants from the air and from many of Canada's sources of drinking water. As well forests sustain much of the remarkable biological diversity this country is known for, creating essential habitat for native plant and animal species.

Urban forests are also recognized for their considerable benefits, including helping to reduce the surface and air temperatures in cities and to improve air and water quality. Additionally, a recent study by TD Economics found that for every dollar spent on tree maintenance in Toronto, urban trees returned about $8 in environmental benefits and cost savings each year.

Urban forests

Urban forests provide health and community benefits to the 80% of Canadians who live in urban areas. For example:

- Shade from urban forests lowers the surface and air temperatures in cities, reducing the urban "heat island" effect.
- Urban forests improve air quality by filtering pollutants that can cause respiratory and cardiovascular diseases.
- Urban forests filter groundwater and reduce the run-off from storms, which helps relieve pressure on municipal water treatment systems.
- Urban forests provide habitat for small urban wildlife such as birds, squirrels and rabbits.
- Urban forests may contribute to enhanced physical and mental well-being of residents by providing areas for recreation and relaxation.

Then there are the immeasurable recreational, cultural, traditional and spiritual benefits that Canada's forest landscapes and resources provide—whether in wilderness areas, managed stands or urban parks. These benefits are deeply valued and enjoyed in some form by most Canadians every day.

Sources: Statistics Canada; Health Canada; ACTrees; TD Economics. See *Sources and information* for more detail.

Spotlight: Aboriginal participation in the forest sector

Forests play a central role in many Aboriginal communities in Canada.

In recent years, many Aboriginal communities have gained increased tenure access not only to Crown lands, but also to forest tenure on reserve lands, with reserve lands now totalling more than 3 million hectares in size. According to the National Aboriginal Forestry Association, Crown land forest tenures held by Aboriginal interests exceeded 27 million cubic metres in annual sustainable timber harvest in 2013—more than 13% of the total Crown land forest harvest volume in Canada in that year.

Aboriginal people account for 4.8% of the total forest sector workforce in Canada, compared to 3% of the total workforce in all sectors together.

Many Aboriginal communities have successfully turned this expanded access to forest land and resources into economic benefits. The 2011 National Household Survey shows that despite the last downturn in Canada's economy, the forest sector has remained an important source of employment for Aboriginal people. In fact, in 2011, there were 9,145 Aboriginal people working in the forest sector. And today, between 1,200 and 1,400 businesses in the forest sector are owned by Aboriginal interests.

As the fastest growing and youngest segment of the Canadian population, Aboriginal people will be able to play an even greater part in supporting the viability of the forest sector in coming years. The sector is expected to be hiring tens of thousands of new workers by 2020 to meet the demands of market expansion, new products, an aging work force, and competition for skilled workers from other industries. Given the already notable level of Aboriginal participation in the forest sector, future growth in Aboriginal training, employment and business ownership in the sector will likely be significant.

Sources: National Aboriginal Forestry Association; Forest Products Sector Council. See *Sources and information* for more detail.

Indicator: Employment

What has changed and why?

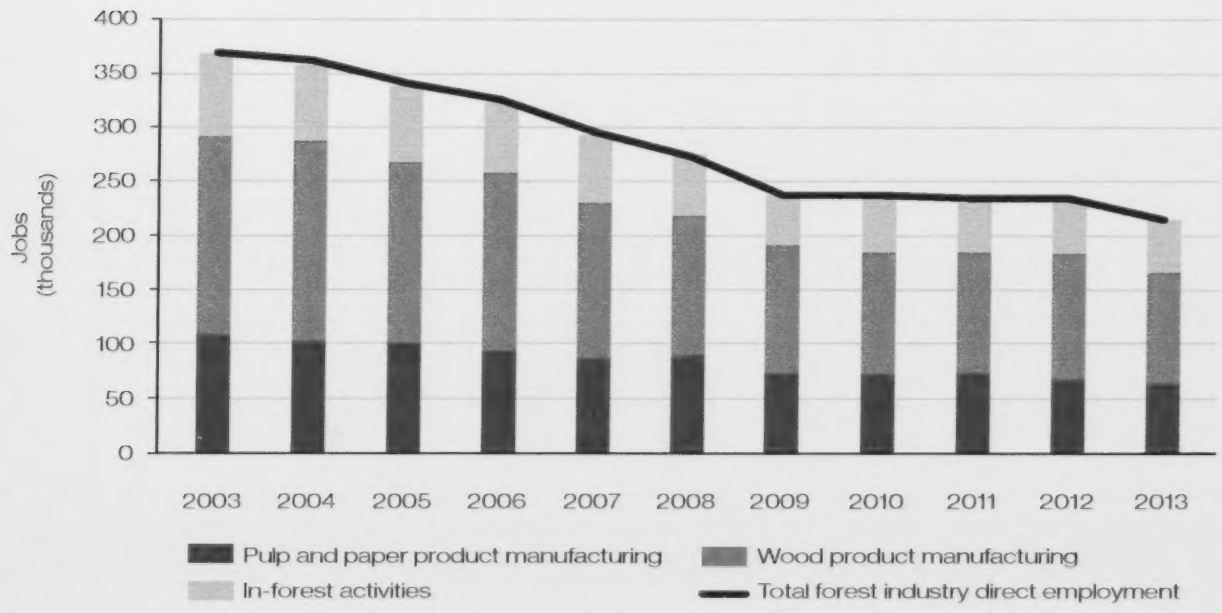
In 2013, direct employment in the Canadian forest industry, as measured by the Labour Force Survey, declined from 2012 levels by 8%, to 216,500 jobs. This figure is contrary to those for other major indications of the health of the forest sector (including other measures of forest sector employment). The forest sector contribution to gross domestic product (GDP) has risen, exports are up and publicly traded firms are showing growth and profits. Furthermore, the other major estimate of employment—Statistics Canada's Survey of Employment, Payroll and Hours—showed a slight increase in employment in the forest sector in 2013.

In the past, the employment measures of these two surveys have moved in tandem. Given that the Labour Force Survey employment figures for forestry during the first months of 2014 have greatly increased, coming back into line with other indicators, it seems likely that a sampling error in the survey led to an underestimate of forest sector employment in 2013, although it cannot be said for certain.

What is the outlook?

With lumber and wood panel markets continuing to improve, employment in wood product manufacturing is expected to increase in 2014. Meanwhile, because challenges facing the pulp and paper product manufacturing industry still exist, the downward pressure on employment in this sector will likely remain. Overall modest improvement in employment through 2014 is expected.

Forest industry direct employment, 2003-2013



Source: Statistics Canada, Labour Force Survey (special extraction).

Indicator: Average earnings

What has changed and why?

In 2013, real average earnings in the forest sector rose slightly from 2012 levels. Increases in forestry and logging (+5.6%) and the pulp and paper sector (+1.3%) counteracted a small decline (-0.9%) in wood product manufacturing. This is a strong performance given that real earnings as a whole in Canada increased by only 0.5% in 2013.

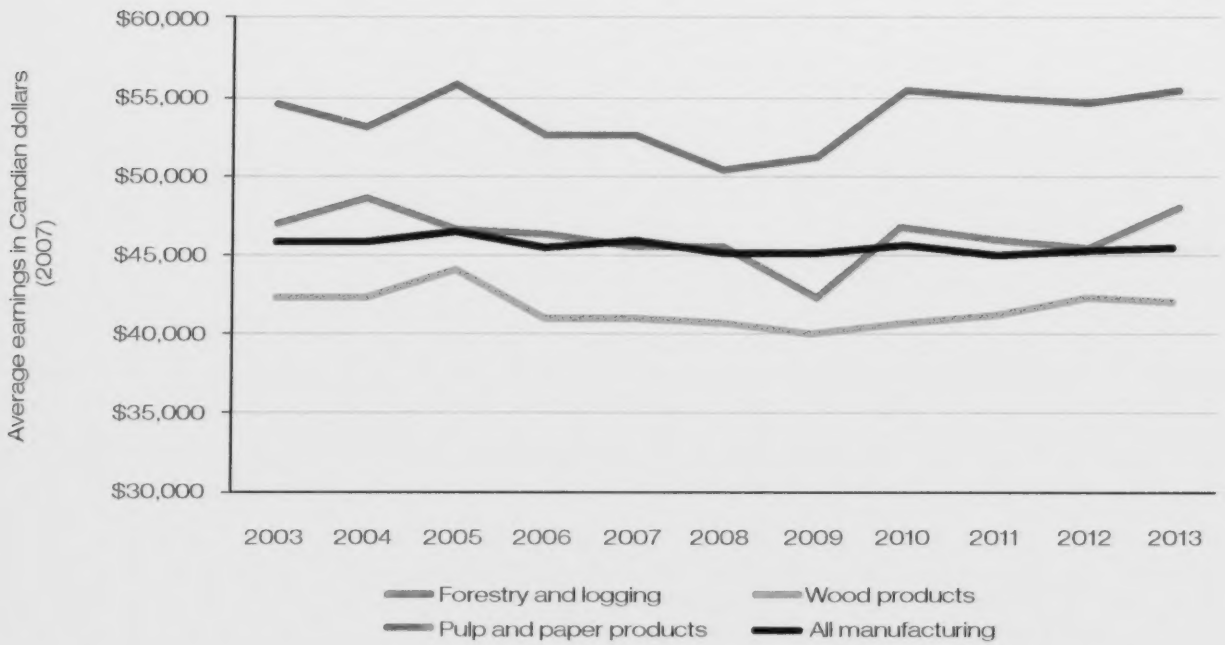
Overall real earnings in the Canadian manufacturing sector have been stagnant since 2003, showing a slight decline (-0.8%) relative to overall real earnings for Canada across all jobs (+5.4%). In 2013, compared with Canadian average earnings, average real earnings in the pulp and paper sector were 33% higher. In logging, the earnings were 15% higher, and in wood product manufacturing they were 1% higher.

What is the outlook?

In general, real earnings in the manufacturing sectors have been stagnant for some time because of the long-term reorientation of the Canadian economy toward the services sector. This phenomenon is common to all high-income countries and is expected to continue for the foreseeable future.

Average earnings in the forest sector relative to the economy's average will likely show a low but positive growth rate, combined with an overall premium in the average earnings level, related to high skills. There will also likely be significant regional variation in some of these values as a result of intermittent local labour shortages and surpluses for certain forestry professions.

Average earnings for workers in the forest industry compared with all manufacturing sectors, 2003–2013



Source: Statistics Canada, Survey of Employment, Payrolls and Hours, Average weekly earnings, current dollars. See *Sources and information* for more detail.

How does the forest sector contribute to the economy?

The Canadian forest industry is an export-oriented manufacturing sector, accounting for almost 6% of all Canadian exports in 2012 ($28 billion). Traditional forest products form the backbone of the Canadian forest industry, with employment and production being dominated by products such as softwood lumber, northern bleached softwood kraft pulp (NBSK), newsprint, and uncoated printing and writing paper. These products are also what Canada excels with on the world stage. Canada is the largest exporter and second largest producer of softwood lumber, the largest NBSK producer (with more than one-third of world production), and the largest newsprint producer.

Although it contributes less to the GDP than other resource sectors do, the forest sector is still a leading contributor to the Canadian economy. Compared with the minerals and metals sector and the energy sector, for example, the forest sector creates more jobs and exports for every dollar of value added.

Benefits to Canada's economy				
Sector	**Contribution to GDP (billions of dollars)**	**Exports per dollar of value added**	**Balance of trade per dollar of value added**	**Employment per million dollars of value added**
Forests	$19.8	$1.44	$0.97	9.34
Minerals and metals	$53.6	$1.71	$0.34	6.13
Energy	$151.5	$0.78	$0.43	1.94

Trade globalization is changing the market and business environment in which Canadian producers operate. In particular, the rapid growth in demand for forest products in China has fundamentally altered forest sector trade over the past 10 years, leading to what is rapidly becoming a single global market for lumber, pulp and paper. Inventory management decisions in China now have a large influence on the daily operations of many Canadian pulp mills.

These changes are bringing opportunities. For example, market diversification and global price convergence are major benefits to Canadian forest producers, offering a buffer against the cyclical swings and price volatility that have traditionally plagued regional markets.

New and innovative products, materials and services are also being produced in Canada's forest sector today. These include new building materials, biofuels that can substitute for fossil fuels, and biochemicals that can be used to produce bio-based pharmaceuticals, biodegradable plastics, personal care products and industrial chemicals. The Government of Canada has been supporting the transformation of the forest sector with a number of initiatives to support traditional and new production. Examples are the Investments in Forest Industry Transformation program, the Expanding Market Opportunities program, and the Forest Innovation program.

Indicator: Contribution of forest products to the gross domestic product

What has changed and why?

In 2013, the forest products sector accounted for 1.25% ($19.8 billion) of Canada's gross domestic product (GDP). This proportion has been stable since 2009, with wood product increases offsetting continued declines in pulp and paper.

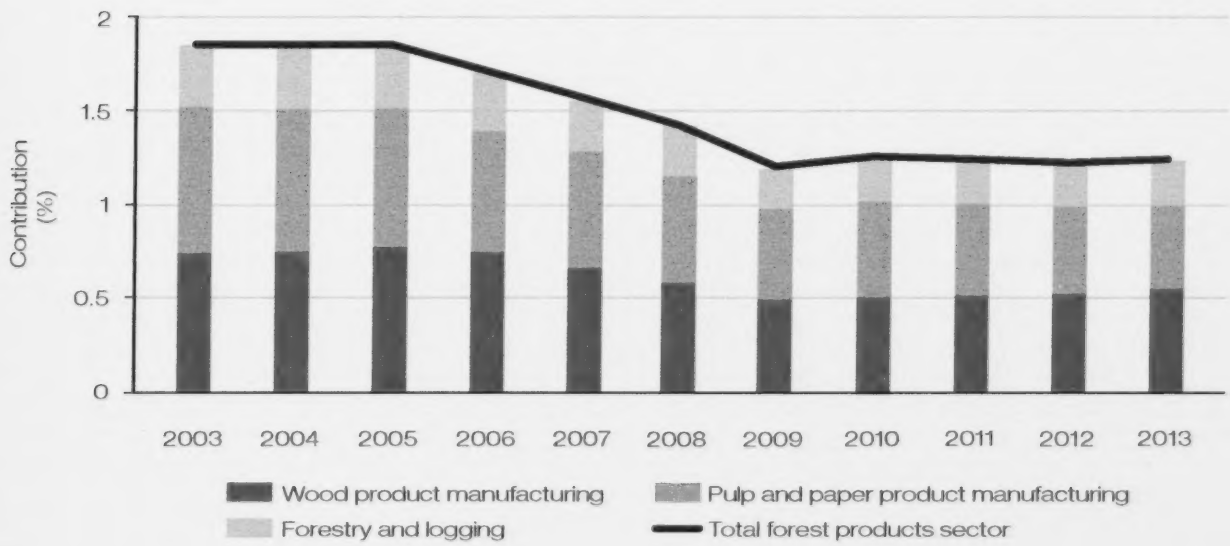
Important to note is that this indicator reflects the performance of both the forest products sector and the Canadian GDP. From 2005 to 2009, the sharp decline in the sector's percent contribution to GDP reflected shrinking economic activity in the sector (impacted by the U.S. housing crisis and a consumer shift to electronic media) and an expanding Canadian economy.

Since 2009, both the sector's economic activity and the Canadian GDP have grown at similar rates, resulting in a stable percentage contribution.

What is the outlook?

Increases in the solid wood sector will continue to be offset by declines in pulp and paper. However, it is difficult to predict how the sector will contribute to Canada's GDP in the future because of several uncertainties. For instance, fibre supply limitations (e.g., because of the mountain pine beetle infestation) could challenge the sector's growth, yet ongoing industry transformation is expected to add to growth from the development of non-traditional bioproducts, biofuels and bioenergy. Also expected to boost the forest products sector are current federal initiatives that promote forest sector transformation.

Forest products sector contribution to GDP in Canada, 2003-2013



Data have been updated to 2007 constant dollars from 2002 constant dollars.

Source: Statistics Canada. See *Sources and information* for more detail.

Indicator: Production of forest products

What has changed and why?

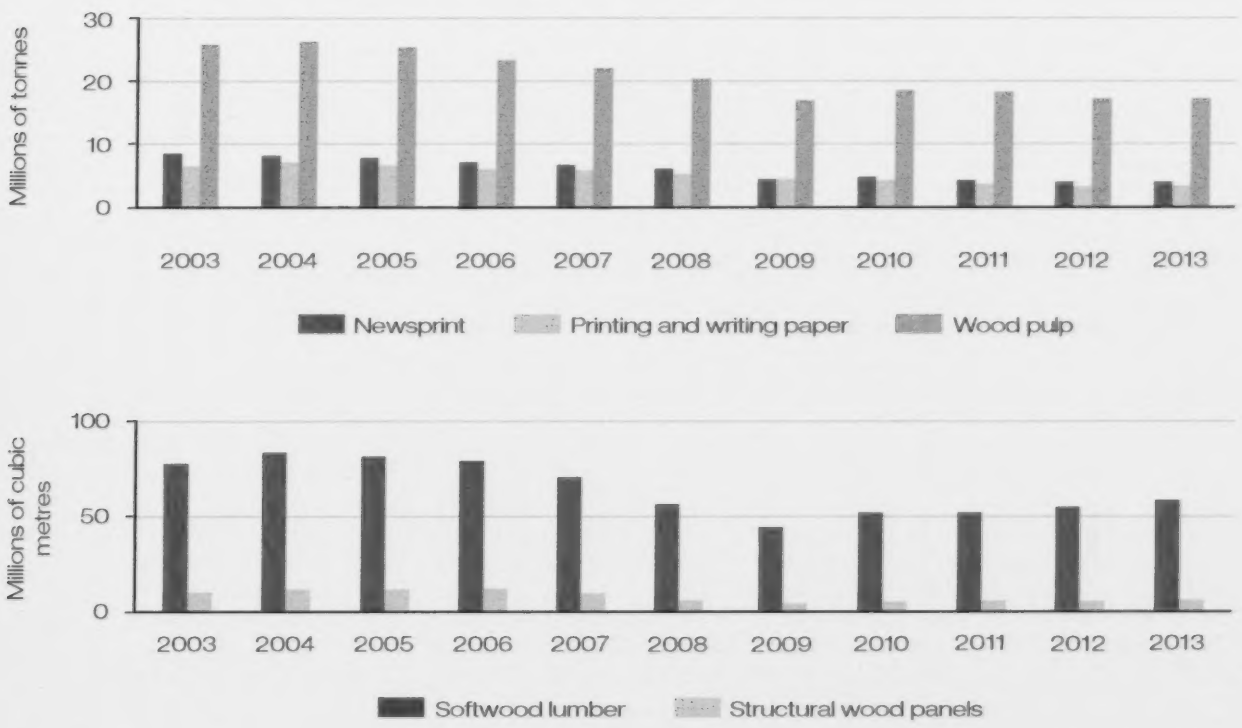
In 2013, production levels rose across all production segments of the forest sector compared with those in 2012. The pace of manufacturing lumber and structural panels accelerated (+6% and +7%, respectively) thanks to the ongoing recovery of the U.S. housing sector. Wood pulp production was largely stable (+1%).

The real change in 2013 was that, for the first time in 10 years, production of newsprint and printing and writing paper increased from the previous year instead of declining (+3% and +5%, respectively). The main reason for that was the growing strength of the U.S. dollar over the Canadian dollar, which facilitated exports and enabled Canadian producers to gain market share of that segment.

What is the outlook?

Solid wood production is expected to continue to show good increases, fuelled by the recovery of U.S. housing starts. Pulp and paper production will likely show mixed fortunes, and newsprint production will likely resume a decline as many paper grades have. Wood pulp production is likely to stay stable or slightly increase, though not regain the levels of the early 2000s.

Production of Canadian forest products, 2003-2013



Sources: Lumber – Statistics Canada; Panels – APA, The Engineered Wood Association; Pulp and paper products – Pulp and Paper Products Council. See *Sources and information* for more detail.

Indicator: Exports of forest products

What has changed and why?

In 2013, the value of Canada's forest product exports increased by 13.1% from 2012 levels, rising to $28.4 billion from $25.1 billion.

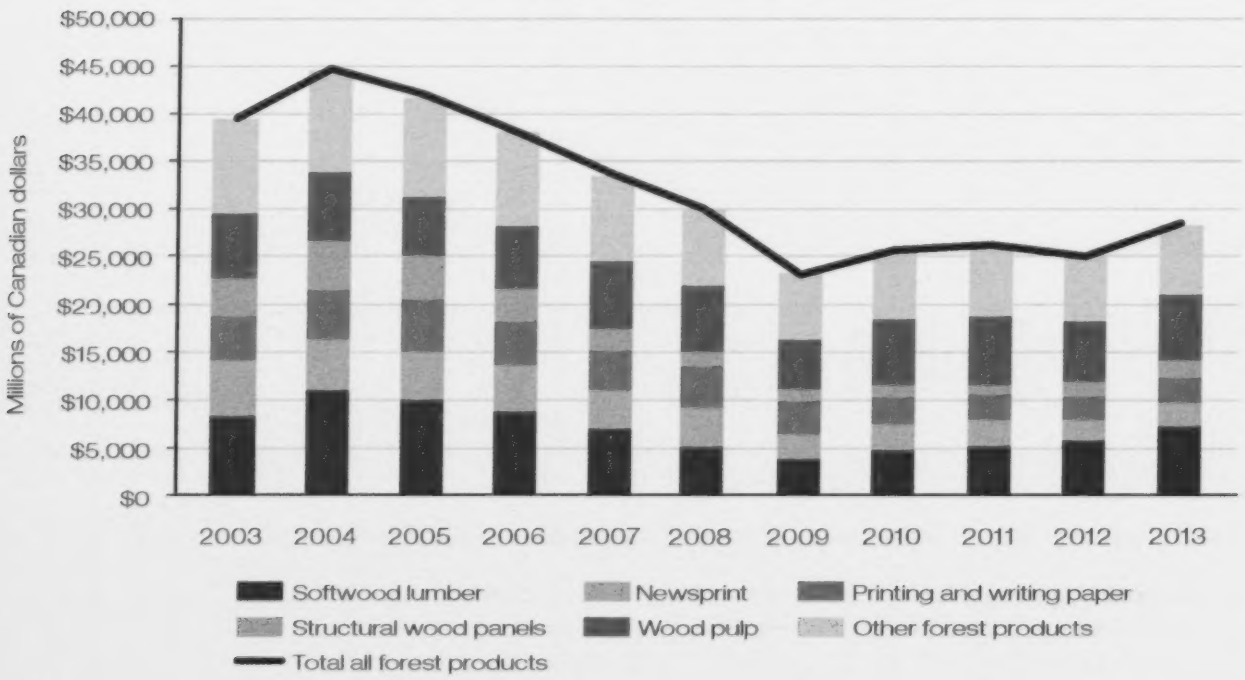
Spurred by the U.S. housing recovery, Canadian softwood lumber exports soared in 2013, rising by 29.5% over 2012 levels, to $7.4 billion. Structural wood panel exports rose by 33.3%, to $2.0 billion.

Wood pulp exports increased only 4.9% over 2012 levels, to $6.7 billion. Newsprint and printing and writing paper exports are in long-term decline with the rise of electronic media, but a weaker Canadian dollar in 2013 favoured Canadian producers over their American counterparts. Both categories saw slight export growth in 2013.

What is the outlook?

Strong growth of exports to emerging Asian economies has reduced the Canadian forest industry's reliance on U.S. markets. For example, in 2013, U.S. markets accounted for 63.7% of Canadian forest product exports, compared with 78.1% in 2003. A rebounding of the U.S. economy will likely support a small reversal of that trend despite continued growth in overseas demand.

Exports of Canadian forest products, 2003-2013



Source: Statistics Canada. See *Sources and information* for more detail.

How is the forest industry changing?

Canada's forest industry is changing. This is not simply a case of entering a new cycle of ups and downs, as is typical of this industry. Rather, it is a structural change, driven by changes in consumer preference, new markets and new ideas.

The Internet and now smartphones have fundamentally altered the way people read the news and get information. Canada's forest industry has seen its markets for products such as newspapers, phone books, directories and flyers shrink substantially. Wood fibre that used to go into making paper is now being redirected to other uses. This has sometimes resulted in a major contraction of the forest sector, as when a mill closes and other uses for the trees cannot be found. However, in regions that concentrate on lumber rather than paper products, the forest industry is doing very well.

With some of the highest operating income in almost a decade, Canada's forest industry is today in good health. While the recovery of U.S. demand is key to this performance, the industry also has global markets to thank for the high prices it has seen. Indeed, the rapid growth in demand for forest products in China has fundamentally altered the trade landscape over the past 10 years.

Forest sector carbon emissions and energy use have declined greatly since 2001 because of the wave of investments in the sector over the past few years. The Government of Canada has been actively supporting the greening of the industry. For instance, the 14 projects funded by the Investments in Forest Industry Transformation program are expected to reduce greenhouse gas emissions by 60 kilotonnes per year and increase Canada's green electricity capacity by 7.2 megawatts.

The basic need to change, the potential offered by new technologies, and the national economic recovery have together prompted many companies in Canada, regardless of size, to pursue transformative investments. Some investment strategies are focusing on innovative or non-traditional products, many of which are secondary manufacturing products—a segment that will play an important role in the future of the industry.

The Canadian forest sector's ability to keep pace with the rapid rate of change in forest industry transformation may remain a challenge. Nevertheless, employment, stability and forest fibre value in Canada are expected to rise as the transformation continues.

Spotlight: Forest sector innovation

A tool for enhanced sustainability and competitiveness in Canada's forest sector

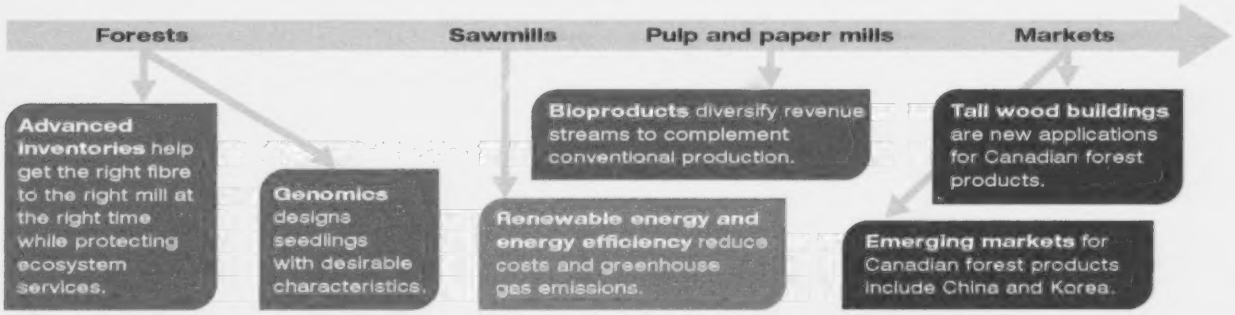
Today's world is dominated by change, with significant fluctuation and transformation occurring across many sectors, driven by demographics, technology, climate change and other factors. In this setting, innovation is critical if businesses are to adapt to changing operating conditions and continue making and selling their products or services competitively. An expert panel (Jenkins et al.) recently went so far as to deem innovation the ultimate source of the quality of life of Canadians, stating that "the ability to conjure up new products and services, to find novel uses for existing products and to develop new markets—these fruits of innovation are the tools that will ensure Canada's success in the twenty-first century."

> **Innovation** is when a new or improved good, service, process or business model is put into practice in a commercially significant way.
>
> *Jenkins et al.*

Innovation is equally critical to the Canadian forest sector. In recent years, the industry has been hard hit by both cyclical and structural pressures, from the collapse of the U.S. softwood lumber markets, and the global economic downturn, to electronic media supplanting newsprint demand. Moving forward, being innovative will be central to competitiveness, providing opportunities for firms to decrease costs, access new revenue streams and become more responsive to customer needs. Canadian firms are already making innovative changes across the entire value chain, from adopting new technologies to developing new client service models and establishing new partnerships.

According to a study released in 2014 by PricewaterhouseCoopers, over 90% of CEOs of Canadian forest, paper and packaging companies acknowledge the need for their companies to increase investment in technology development and research and development capacity improvements.

Applied innovation across the Canadian forest sector value chain


Forests
Sawmills
Pulp and paper mills
Markets
Advanced inventories help get the right fibre to the right mill at the right time while protecting ecosystem services.
Genomics designs seedlings with desirable characteristics.
Renewable energy and energy efficiency reduce costs and greenhouse gas emissions.
Bioproducts diversify revenue streams to complement conventional production.
Emerging markets for Canadian forest products include China and Korea.
Tall wood buildings are new applications for Canadian forest products.

The Government of Canada is committed to supporting innovation in the forest sector. Among its initiatives are the Investments in Forest Industry Transformation program, the Expanding Market Opportunities program and the Forest Innovation program. In this way, the programs are helping create a more sustainable and resilient future for the forest industry and the communities that depend on it.

Sources: Jenkins, T. et al.; PricewaterhouseCoopers. See *Sources and information* for more detail.

Indicator: Financial performance

What has changed and why?

The financial performance of the Canadian forest industry improved significantly in 2013. Operating profits reached $2.7 billion in 2013, up 152% from 2012. This is the highest operating profit earned over the past eight years. It also represents a considerable rebound from the weak financial performance in 2011 and 2012.

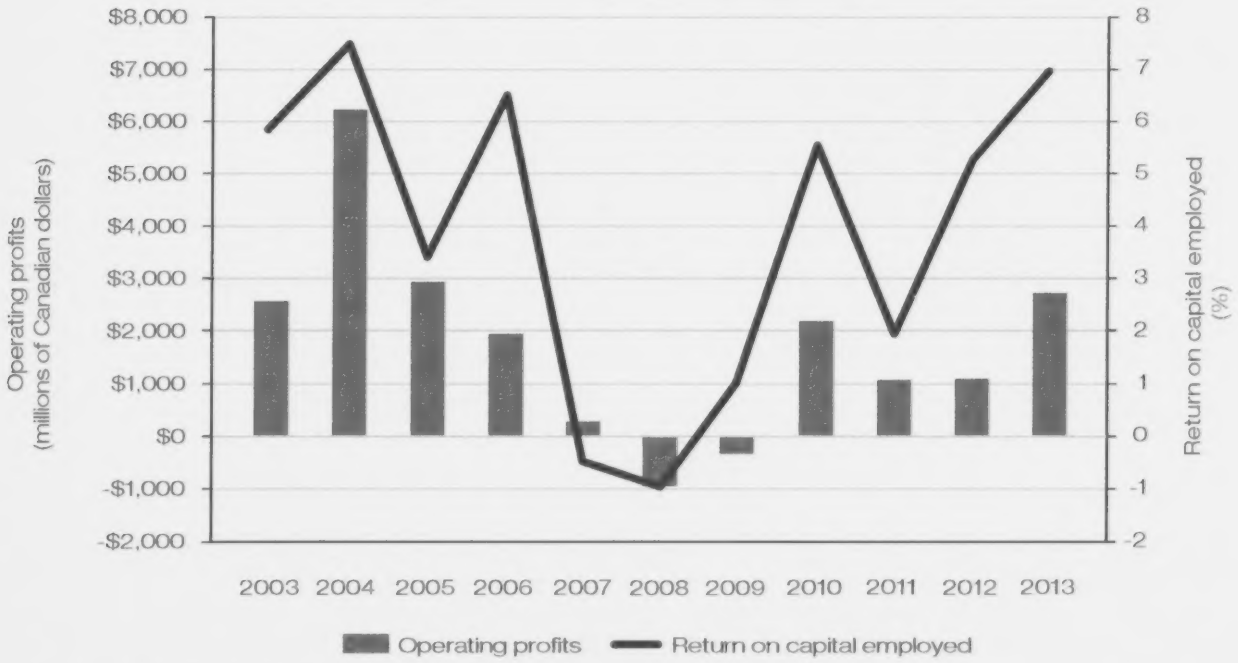
The return on capital employed reached 7.0% in 2013, also a significant bounce-back from the previous two years. It is now well above the long-term average (3.7%) of the past 10 years.

The improvements in financial performance in 2013 were mainly the result of strong wood product demand and pricing, which offset the negative impacts of falling demand for certain paper product grades, particularly newsprint and graphic paper.

What is the outlook?

North American and overseas wood product markets are likely to continue to be solid in the short to medium term, and to positively affect the financial performance of the forest industry. The recent fall of the Canadian dollar will also help the pulp and paper sector, which is still facing challenges. The result will be to enhance the Canadian forest industry's competitiveness in the global market. Better financial performance will enable the Canadian forest industry to make much-needed strategic investments and thus further improve efficiency in the future.

Financial performance by Canada's forest industry, 2003–2013



Source: Statistics Canada. *Quarterly Financial Statistics for Enterprises.*

Indicator: Secondary manufacturing of forest products

What has changed and why?

In 2012, the secondary paper and wood industries in Canada generated over $6.2 billion of value-added forest products. This was a small decline from 2011, and 17% less than the high achieved in 2004. The percentage of the total forest product value derived from secondary manufacturing stood at 39% in 2012, the same as in 2011 and up from 20% in 2004.

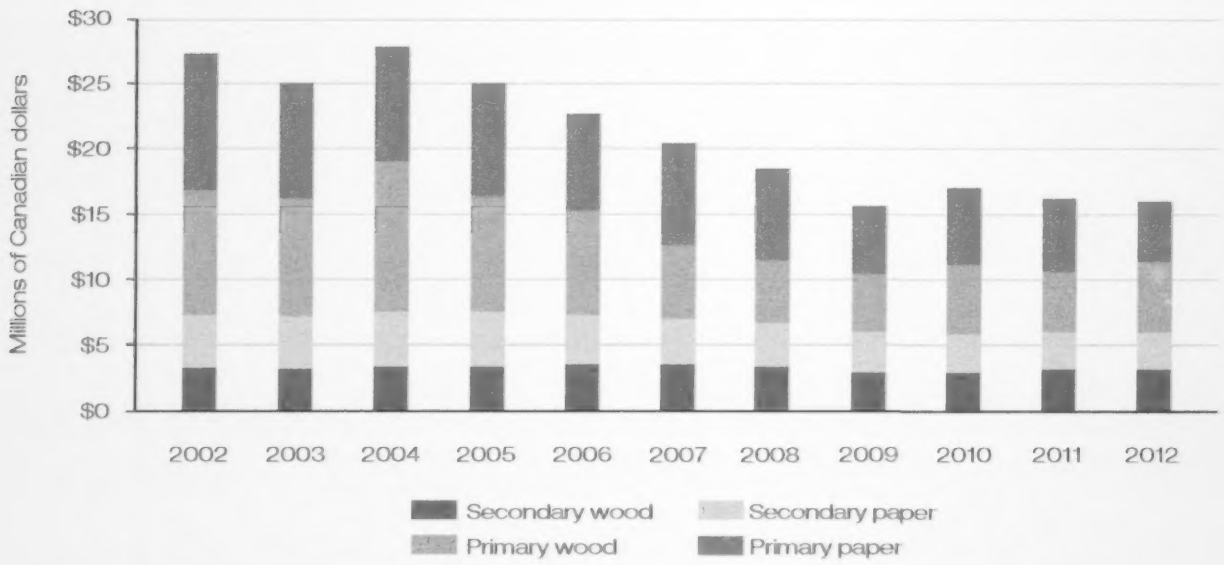
Although the secondary manufacturing subsector has declined, it has done relatively better than the primary subsector, and has thus helped buoy the overall forest sector through significant negative changes since 2000.

The secondary manufacturing of paper began to decline in 2002, largely because of falling paper consumption in Canada and the U.S. and because of broader global trends, such as increased share of global manufacturing in developing countries. The secondary wood manufacturing subsector began to decline in 2007, undermined by the U.S. housing recession and the broader world recession that followed.

What is the outlook?

A negative outlook for paper demand is expected, given the continuing trend to electronic technology adoption, the shifts in global manufacturing and trade, and the ongoing efforts in North America to reduce the use of packaging materials. On the other hand, the continued U.S. economic recovery—in particular, the recovery of the housing market to historical norms—will likely lead to increased demand for primary and secondary wood products. Competition from low-cost producers will likely be mitigated by Canada's forest sector transformative strategy, which includes developing new wood-fibre-based value-added products, expanding into new and traditional markets, and capitalizing on environmental stewardship credentials.

Value added from primary and secondary wood and paper product industries, 2002-2012



Source: Statistics Canada. See *Sources and information* for more detail.

Indicator: Forest sector carbon emissions

What has changed and why?

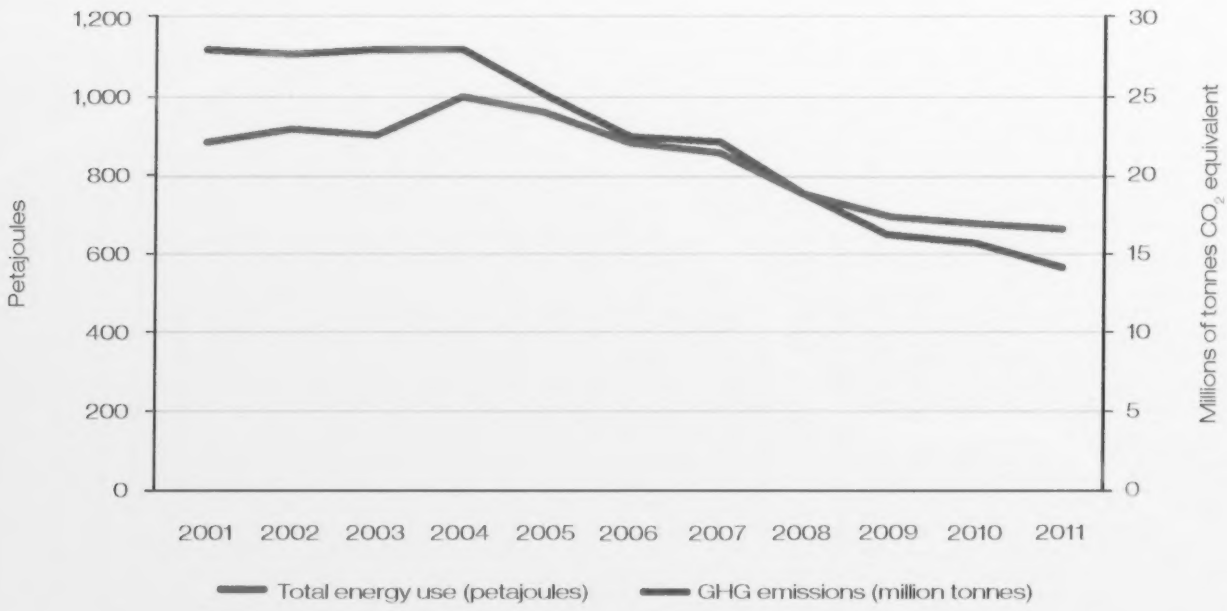
A changing energy mix and greater energy efficiency are clearly reducing energy use and greenhouse gas (GHG) emissions in the forest sector. The forest sector's substantial cut in fossil fuel use between 2000 and 2011 has helped reduce direct emissions by 50% and total energy use by 30%.

Some of this decline can be attributed to the contraction of the forest sector during 2005–2009. A large part of it, however, is a result of changing energy usage and increases in the self-generation of power.

What is the outlook?

Investments in technologies that reduce energy use and GHG emissions are expected to continue. Such technologies have significant environmental benefits, and also reduce energy costs for manufacturers. Somewhat tempering these efficiency gains is the expected rebound in economic activity. While a return to the higher energy usage and GHG emission rates of the 1990s is not expected, the current rates of decline will likely flatten.

Fossil fuel greenhouse gas (GHG) emissions and total energy use in Canada's forest sector, 2001–2011



Source: Statistics Canada, *Report on Energy Supply and Demand in Canada*. See *Sources and information* for more detail.

Statistical profiles

Canada

Population (April 2014)	35,427,524
Arboreal emblem	Maple
FOREST INVENTORY	
Forest area by classification (hectares)	
Forest land	347,575,750
Other wooded land	40,865,660
Other land with tree cover	8,498,940
Total area	**396,940,350**
Forest area change (hectares, 2012)	
Afforestation	Not available
Deforestation	45,800
Forest type (forest land only)	
Coniferous	67.8%
Mixedwood	15.8%
Broadleaf	10.5%
Temporarily non-treed	5.9%
Growing stock (million cubic metres)	
Total volume	**47,320**
Forest ownership	
Provincial	76.6%
Territorial	12.9%
Private	6.2%
Aboriginal	2.0%
Federal	1.6%
Municipal	0.3%
Other	0.4%
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing beetle-killed trees	8,582,720
Fire (2013)	
Area burned (hectares)	4,203,867
Number of fires	6,246

FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	594,003
Volume harvested (cubic metres)	151,978,000
Regeneration (hectares, 2012)	
Area planted	347,127
Area seeded	10,576
Third-party certification (hectares, 2013)	
Area certified	152,937,728
Protected forest (IUCN categories)	
I a Strict nature reserve	0.1%
I b Wilderness area	1.9%
II Ecosystem conservation and protection	4.2%
III Conservation of natural features	0.5%
IV Conservation through active management	0.2%
V Landscape conservation and recreation	0.02%
GREENHOUSE GAS INVENTORY	
For forest lands affected by land-use change (2012)	
Removals from the atmosphere due to afforestation (CO_2e/yr, megatonnes)	0.7
Emissions due to deforestation (CO_2e/yr, megatonnes)	10.7
For managed forests (2012)	
Area of managed forests (hectares)	232,000,000
Net removals due to forest biomass and dead organic matter (CO_2e/yr, megatonnes)	148.0
Net emissions to the atmosphere (CO_2e/yr, megatonnes)	32.0
DOMESTIC ECONOMIC IMPACT	
Canadian housing starts (2013)	187,923
Contribution to nominal GDP (current dollars, 2013)	
Forestry and logging industry	4,100,000,000
Pulp and paper product manufacturing industry	8,000,000,000
Wood product manufacturing industry	8,800,000,000
Total contribution to nominal GDP	**20,900,000,000**
Contribution to real GDP (constant 2007 dollars, 2013)	
Forestry and logging industry	3,900,000,000
Pulp and paper product manufacturing industry	8,800,000,000
Wood product manufacturing industry	7,100,000,000
Total contribution to real GDP	**19,800,000,000**
Revenue from goods manufactured (dollars, 2012)	
Forestry and logging industry	8,565,752,000
Pulp and paper product manufacturing	23,140,129,000
Wood product manufacturing industry	21,454,027,000
Total revenue from goods manufactured	**53,159,908,000**

FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2013)	
Labour Force Survey	216,500
Survey of Employment, Payrolls and Hours	186,561
Canadian System of National Accounts	208,915
Direct and indirect employment	321,300
Wages and salaries (dollars, 2012)	
Forestry and logging industry	1,363,229,000
Pulp and paper manufacturing industry	3,358,417,000
Wood product manufacturing industry	3,935,149,000
Total wages and salaries	**8,656,795,000**

TRADE	
Balance of trade (total exports, dollars, 2013)	19,205,972,823
Value of exports (dollars, 2013)	
Primary wood products	1,300,128,228
Pulp and paper products	15,729,889,975
Wood-fabricated materials	11,388,478,205
Total value of exports	**28,418,496,408**
Value of imports (dollars, 2013)	
Primary wood products	464,447,302
Pulp and paper products	6,077,511,138
Wood-fabricated materials	2,836,032,192
Total value of imports	**9,377,990,632**

DOMESTIC PRODUCTION AND INVESTMENT	
Production (2013)	
Hardwood lumber (cubic metres)	1,306,200
Softwood lumber (cubic metres)	57,687,700
Newsprint (tonnes)	3,972,000
Printing and writing paper (tonnes)	3,466,000
Wood pulp (tonnes)	17,254,000
Structural panels (plywood and oriented strandboard, cubic metres)	7,132,294
Capital expenditures (dollars, 2013)	
Forestry and logging industry	329,500,000
Pulp and paper product manufacturing industry	1,445,300,000
Wood product manufacturing industry	398,900,000
Total capital expenditures	**2,173,700,000**
Repair expenditures (dollars, 2012)	
Forestry and logging industry	381,300,000
Pulp and paper product manufacturing industry	1,702,000,000
Wood product manufacturing industry	627,600,000
Total repair expenditures	**2,710,900,000**

DOMESTIC CONSUMPTION	
Consumption (2013)	
Hardwood lumber (cubic metres)	1,969,127
Softwood lumber (cubic metres)	20,922,999
Newsprint (tonnes)	797,878
Printing and writing paper (tonnes)	1,224,000
Wood pulp (tonnes)	7,766,338
Structural panels (plywood and oriented strandboard, cubic metres)	3,493,585

Sources and information for the statistical profiles are provided starting on page 59.

British Columbia

Population (April 2014)	4,624,321
Arboreal emblem	Western redcedar
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing *beetle-killed* trees	5,760,982
Fire (2013)	
Area burned (hectares)	17,990
Number of fires	1,854
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	188,926
Volume harvested (cubic metres)	68,832,000
Regeneration (hectares, 2012)	
Area planted	170,775
Area seeded	Not available
Third-party certification (hectares, 2013)	
Area certified	51,954,264
DOMESTIC ECONOMIC IMPACT	
Housing starts (2013)	27,054
Revenue from goods manufactured (dollars, 2012)	
Forestry and logging industry	4,022,676,000
Pulp and paper product manufacturing industry	4,441,381,000
Wood product manufacturing industry	7,611,884,000
Total revenue from goods manufactured	**16,075,941,000**
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2013)	
Labour Force Survey	58,300
Survey of Employment, Payrolls and Hours	47,050
Canadian System of National Accounts	51,995
Wages and salaries (dollars, 2012)	
Forestry and logging industry	599,458,000
Pulp and paper product manufacturing industry	600,468,000
Wood product manufacturing industry	1,266,901,000
Total wages and salaries	**2,466,827,000**
TRADE	
Balance of trade (total exports, dollars, 2013)	9,903,132,516
Value of domestic exports (dollars, 2013)	
Primary wood products	1,095,578,989
Pulp and paper products	3,852,709,675
Wood-fabricated materials	6,520,487,371
Total value of domestic exports	**11,468,776,035**
Value of imports (dollars, 2013)	
Primary wood products	70,368,719
Pulp and paper products	711,406,921
Wood-fabricated materials	786,413,651
Total value of imports	**1,568,189,291**

Alberta

Population (April 2014)	4,111,509
Arboreal emblem	Lodgepole pine
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing beetle-killed trees	524,724
Fire (2013)	
Area burned (hectares)	21,890
Number of fires	1,214
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	81,441
Volume harvested (cubic metres)	22,750,000
Regeneration (hectares, 2012)	
Area planted	58,302
Area seeded	834
Third-party certification (hectares, 2013)	
Area certified	18,413,936
DOMESTIC ECONOMIC IMPACT	
Housing starts (2013)	36,011
Revenue from goods manufactured (dollars, 2012)	
Forestry and logging industry	850,368,000
Pulp and paper product manufacturing industry	1,613,938,000
Wood product manufacturing industry	2,890,505,000
Total revenue from goods manufactured	**5,354,811,000**
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2013)	
Labour Force Survey	15,400
Survey of Employment, Payrolls and Hours	20,092
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2012)	
Forestry and logging industry	148,553,000
Pulp and paper product manufacturing industry	211,058,000
Wood product manufacturing industry	596,248,000
Total wages and salaries	**955,859,000**
TRADE	
Balance of trade (total exports, dollars, 2013)	2,003,228,251
Value of domestic exports (dollars, 2013)	
Primary wood products	23,389,555
Pulp and paper products	1,638,616,527
Wood-fabricated materials	689,075,581
Total value of domestic exports	**2,351,081,663**
Value of imports (dollars, 2013)	
Primary wood products	7,720,001
Pulp and paper products	179,427,262
Wood-fabricated materials	161,537,008
Total value of imports	**348,684,271**

Saskatchewan

Population (April 2014)	**1,122,568**
Arboreal emblem	White birch
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing beetle-killed trees	82,595
Fire (2013)	
Area burned (hectares)	312,194
Number of fires	429
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	14,562
Volume harvested (cubic metres)	2,914,000
Regeneration (hectares, 2012)	
Area planted	1,671
Area seeded	27
Third-party certification (hectares, 2013)	
Area certified	5,847,958
DOMESTIC ECONOMIC IMPACT	
Housing starts (2013)	8,290
Revenue from goods manufactured (dollars, 2012)	
Forestry and logging industry	89,660,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	348,019,000
Total revenue from goods manufactured	**Not available**
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2013)	
Labour Force Survey	3,100
Survey of Employment, Payrolls and Hours	Not available
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2012)	
Forestry and logging industry	15,560,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	74,935,000
Total wages and salaries	**Not available**
TRADE	
Balance of trade (total exports, dollars, 2013)	370,416,069
Value of domestic exports (dollars, 2013)	
Primary wood products	2,386,864
Pulp and paper products	206,398,133
Wood-fabricated materials	233,509,847
Total value of domestic exports	**442,294,844**
Value of imports (dollars, 2013)	
Primary wood products	1,802,567
Pulp and paper products	34,939,932
Wood-fabricated materials	35,438,562
Total value of imports	**72,181,061**

Manitoba

Population (April 2014)	**1,275,212**
Arboreal emblem	White spruce
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing beetle-killed trees	1,473
Fire (2013)	
Area burned (hectares)	1,115,411
Number of fires	494
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	7,573
Volume harvested (cubic metres)	1,243,000
Regeneration (hectares, 2012)	
Area planted	4,995
Area seeded	Not available
Third-party certification (hectares, 2013)	
Area certified	10,571,283
DOMESTIC ECONOMIC IMPACT	
Housing starts (2013)	7,465
Revenue from goods manufactured (dollars, 2012)	
Forestry and logging industry	42,355,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	417,156,000
Total revenue from goods manufactured	**Not available**
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2013)	
Labour Force Survey	4,500
Survey of Employment, Payrolls and Hours	Not available
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2012)	
Forestry and logging industry	9,852,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	92,570,000
Total wages and salaries	**Not available**
TRADE	
Balance of trade (total exports, dollars, 2013)	-53,123,943
Value of domestic exports (dollars, 2013)	
Primary wood products	966,379
Pulp and paper products	229,537,692
Wood-fabricated materials	135,556,111
Total value of domestic exports	**366,060,182**
Value of imports (dollars, 2013)	
Primary wood products	2,649,586
Pulp and paper products	274,511,115
Wood-fabricated materials	142,220,039
Total value of imports	**419,380,740**

Ontario

Population (April 2014)	13,820,646
Arboreal emblem	Eastern white pine
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing beetle-killed trees	423,345
Fire (2013)	
Area burned (hectares)	43,422
Number of fires	582
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	115,358
Volume harvested (cubic metres)	12,600,000
Regeneration (hectares, 2012)	
Area planted	37,609
Area seeded	9,639
Third-party certification (hectares, 2013)	
Area certified	24,616,367
DOMESTIC ECONOMIC IMPACT	
Housing starts (2013)	61,085
Revenue from goods manufactured (dollars, 2012)	
Forestry and logging industry	944,999,000
Pulp and paper product manufacturing industry	6,574,632,000
Wood product manufacturing industry	3,062,355,000
Total revenue from goods manufactured	**10,581,986,000**
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2013)	
Labour Force Survey	43,800
Survey of Employment, Payrolls and Hours	37,799
Canadian System of National Accounts	47,700
Wages and salaries (dollars, 2012)	
Forestry and logging industry	153,045,000
Pulp and paper product manufacturing industry	1,147,373,000
Wood product manufacturing industry	647,652,000
Total wages and salaries	**1,948,070,000**
TRADE	
Balance of trade (total exports, dollars, 2013)	-1,115,547,855
Value of domestic exports (dollars, 2013)	
Primary wood products	34,841,583
Pulp and paper products	2,486,082,408
Wood-fabricated materials	1,083,475,666
Total value of domestic exports	**3,604,399,657**
Value of imports (dollars, 2013)	
Primary wood products	50,125,913
Pulp and paper products	3,660,497,629
Wood-fabricated materials	1,154,455,664
Total value of imports	**4,865,079,206**

Quebec

Population (April 2014)	8,191,946
Arboreal emblem	Yellow birch
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing beetle-killed trees	1,545,350
Fire (2013)	
Area burned (hectares)	1,872,842
Number of fires	515
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	88,883
Volume harvested (cubic metres)	29,201,000
Regeneration (hectares, 2012)	
Area planted	44,413
Area seeded	41
Third-party certification (hectares, 2013)	
Area certified	34,832,898
DOMESTIC ECONOMIC IMPACT	
Housing starts (2013)	37,758
Revenue from goods manufactured (dollars, 2012)	
Forestry and logging industry	1,945,115,000
Pulp and paper product manufacturing industry	7,838,083,000
Wood product manufacturing industry	5,784,062,000
Total revenue from goods manufactured	**15,567,260,000**
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2013)	
Labour Force Survey	71,400
Survey of Employment, Payrolls and Hours	60,082
Canadian System of National Accounts	65,270
Wages and salaries (dollars, 2012)	
Forestry and logging industry	315,905,000
Pulp and paper product manufacturing industry	1,036,310,000
Wood product manufacturing industry	1,015,771,000
Total wages and salaries	**2,367,986,000**
TRADE	
Balance of trade (total exports, dollars, 2013)	6,120,235,816
Value of domestic exports (dollars, 2013)	
Primary wood products	86,331,014
Pulp and paper products	5,682,562,028
Wood-fabricated materials	2,161,043,878
Total value of domestic exports	**7,929,936,920**
Value of imports (dollars, 2013)	
Primary wood products	270,077,310
Pulp and paper products	1,073,148,236
Wood-fabricated materials	480,548,267
Total value of imports	**1,823,773,813**

New Brunswick

Population (April 2014)	754,524
Arboreal emblem	Balsam fir
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing beetle-killed trees	54,020
Fire (2013)	
Area burned (hectares)	886
Number of fires	356
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	57,772
Volume harvested (cubic metres)	9,457,000
Regeneration (hectares, 2012)	
Area planted	18,798
Area seeded	Not available
Third-party certification (hectares, 2013)	
Area certified	3,767,868
DOMESTIC ECONOMIC IMPACT	
Housing starts (2013)	2,843
Revenue from goods manufactured (dollars, 2012)	
Forestry and logging industry	485,510,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	897,477,000
Total revenue from goods manufactured	**Not available**
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2013)	
Labour Force Survey	12,400
Survey of Employment, Payrolls and Hours	9,205
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2012)	
Forestry and logging industry	77,019,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	157,023,000
Total wages and salaries	**Not available**
TRADE	
Balance of trade (total exports, dollars, 2013)	1,292,492,208
Value of domestic exports (dollars, 2013)	
Primary wood products	33,230,100
Pulp and paper products	1,015,913,366
Wood-fabricated materials	461,556,868
Total value of domestic exports	**1,510,700,334**
Value of imports (dollars, 2013)	
Primary wood products	61,692,303
Pulp and paper products	115,110,559
Wood-fabricated materials	43,410,904
Total value of imports	**220,213,766**

Nova Scotia

Population (April 2014)	939,396
Arboreal emblem	Red spruce
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and ontaining beetle-killed trees	Not available
Fire (2013)	
Area burned (hectares)	301
Number of fires	171
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	30,230
Volume harvested (cubic metres)	3,447,000
Regeneration (hectares, 2012)	
Area planted	5,973
Area seeded	Not available
Third-party certification (hectares, 2013)	
Area certified	1,439,303
DOMESTIC ECONOMIC IMPACT	
Housing starts (2013)	3,919
Revenue from goods manufactured (dollars, 2012)	
Forestry and logging industry	129,609,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	370,184,000
Total revenue from goods manufactured	**Not available**
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2013)	
Labour Force Survey	5,700
Survey of Employment, Payrolls and Hours	Not available
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2012)	
Forestry and logging industry	28,365,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	67,379,000
Total wages and salaries	**Not available**
TRADE	
Balance of trade (total exports, dollars, 2013)	590,185,525
Value of domestic exports (dollars, 2013)	
Primary wood products	23,317,405
Pulp and paper products	521,580,739
Wood-fabricated materials	97,523,480
Total value of domestic exports	**642,421,624**
Value of imports (dollars, 2013)	
Primary wood products	288
Pulp and paper products	20,773,789
Wood-fabricated materials	31,778,508
Total value of imports	**52,552,585**

Prince Edward Island

Population (April 2014)	145,472
Arboreal emblem	Red oak
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing beetle-killed trees	30
Fire (2013)	
Area burned (hectares)	55
Number of fires	9
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	2,871
Volume harvested (cubic metres)	389,000
Regeneration (hectares, 2012)	
Area planted	220
Area seeded	Not available
Third-party certification (hectares, 2013)	
Area certified	446
DOMESTIC ECONOMIC IMPACT	
Housing starts (2013)	636
Revenue from goods manufactured (dollars, 2012)	
Forestry and logging industry	Not available
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	15,679,000
Total revenue from goods manufactured	**Not available**
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2013)	
Labour Force Survey	400
Survey of Employment, Payrolls and Hours	Not available
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2012)	
Forestry and logging industry	Not available
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	3,561,000
Total wages and salaries	**Not available**
TRADE	
Balance of trade (total exports, dollars, 2013)	2,182,829
Value of domestic exports (dollars, 2013)	
Primary wood products	24,099
Pulp and paper products	1,911,429
Wood-fabricated materials	260,482
Total value of domestic exports	**2,196,010**
Value of imports (dollars, 2013)	
Primary wood products	0
Pulp and paper products	275
Wood-fabricated materials	13,032
Total value of imports	**13,307**

Newfoundland and Labrador

Population (April 2014)	525,378
Arboreal emblem	Black spruce
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing beetle-killed trees	61,333
Fire (2013)	
Area burned (hectares)	43,076
Number of fires	101
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	6,007
Volume harvested (cubic metres)	1,107,000
Regeneration (hectares, 2012)	
Area planted	4,371
Area seeded	Not available
Third-party certification (hectares, 2013)	
Area certified	1,493,405
DOMESTIC ECONOMIC IMPACT	
Housing starts (2013)	2,862
Revenue from goods manufactured (dollars, 2012)	
Forestry and logging industry	50,863,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	56,706,000
Total revenue from goods manufactured	**Not available**
FOREST INDUSTRY EMPLOYMENT	
Employment (number, 2013)	
Labour Force Survey	1,600
Survey of Employment, Payrolls and Hours	Not available
Canadian System of National Accounts	Not available
Wages and salaries (dollars, 2012)	
Forestry and logging industry	14,694,000
Pulp and paper product manufacturing industry	Not available
Wood product manufacturing industry	13,109,000
Total wages and salaries	**Not available**
TRADE	
Balance of trade (total exports, dollars, 2013)	92,533,699
Value of domestic exports (dollars, 2013)	
Primary wood products	62,240
Pulp and paper products	94,549,299
Wood-fabricated materials	5,766,601
Total value of domestic exports	**100,378,140**
Value of imports (dollars, 2013)	
Primary wood products	10,615
Pulp and paper products	7,688,273
Wood-fabricated materials	210,413
Total value of imports	**7,909,301**

Yukon

Population (April 2014)	36,665
Arboreal emblem	Subalpine fir
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing beetle-killed trees	72,608
Fire (2013)	
Area burned (hectares)	179,510
Number of fires	177
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	300
Volume harvested (cubic metres)	27,000
Regeneration (hectares, 2012)	
Area planted	Not available
Area seeded	35
Third-party certification (hectares, 2013)	
Area certified	Not available
TRADE	
Balance of trade (total exports, dollars, 2013)	145,616
Value of domestic exports (dollars, 2013)	
Primary wood products	0
Pulp and paper products	0
Wood-fabricated materials	158,907
Total value of domestic exports	**158,907**
Value of imports (dollars, 2013)	
Primary wood products	0
Pulp and paper products	7,147
Wood-fabricated materials	6,144
Total value of imports	**13,291**

Northwest Territories

Population (April 2014)	43,459
Arboreal emblem	Tamarack
DISTURBANCE	
Insects (hectares, 2012)	
Area defoliated by insects and containing beetle-killed trees	56,205
Fire (2013)	
Area burned (hectares)	537,912
Number of fires	248
FOREST MANAGEMENT	
Harvesting (2012)	
Area harvested (hectares)	80
Volume harvested (cubic metres)	11,000
Regeneration (hectares, 2012)	
Area planted	Not available
Area seeded	Not available
Third-party certification (hectares, 2013)	
Area certified	Not available
TRADE	
Balance of trade (total exports, dollars, 2013)	43,426
Value of domestic exports (dollars, 2013)	
Primary wood products	0
Pulp and paper products	0
Wood-fabricated materials	43,426
Total value of domestic exports	**43,426**
Value of imports (dollars, 2013)	
Primary wood products	0
Pulp and paper products	0
Wood-fabricated materials	0
Total value of imports	**0**

Nunavut

Population (April 2014)	36,408
TRADE	
Balance of trade (total exports, dollars, 2013)	48,666
Value of domestic exports (dollars, 2013)	
Primary wood products	0
Pulp and paper products	28,679
Wood-fabricated materials	19,987
Total value of domestic exports	**48,666**
Value of imports (dollars, 2013)	
Primary wood products	0
Pulp and paper products	0
Wood-fabricated materials	0
Total value of imports	**0**

Sources and **information**

The data in this report are derived from a number of sources, which are identified here by their relevant section. Where necessary, they have been edited for accuracy and consistency. All data are subject to revision.

In most cases, the data represent the year before the reporting period. However, when they are gathered from several sources, it takes longer to analyze and produce them. In these cases, the numbers reflect results from two or three years before the reporting period.

While most figures are calculated for the calendar year, some are based on the federal government's fiscal year (April 1 to March 31). Numbers are rounded off. In the case of employment data, they are rounded to the nearest hundred.

It may not be possible to compare directly the data from the various sections, as they come from several sources that may compile their statistics differently from each other.

Sustainability indicators

How much forest does Canada have?

Sources:

- Canada's National Forest Inventory, Standard Reports, Table 4.1, Area of forest and non-forest land by terrestrial ecozone in Canada, https://nfi.nfis.org/standardreports.php
- Food and Agriculture Organization of the United Nations. 2010. *Global Forest Resources Assessment*, http://www.fao.org/docrep/013/i1757e/i1757e.pdf
- Wulder, M.A., et al. 2007. National circumstances in the international circumboreal community, *Forestry Chronicle* 83(4): 539–56, DOI: 10.5558/tfc83539-4

Indicator: Forest area

Source:

- Canada's National Forest Inventory, Standard Reports, Table 4.1, Area of forest and non-forest land by terrestrial ecozone in Canada, https://nfi.nfis.org/standardreports.php

Notes:

- Additional information can be found at:
  - Canadian Council of Forest Ministers. 2009. *Vulnerability of Canada's Tree Species to Climate Change and Management Options for Adaptation: An Overview for Policy Makers and Practitioners*, http://cfs.nrcan.gc.ca/publications?id=30276
  - Michaelian, M., et al. 2011. Massive mortality of aspen following severe drought along the southern edge of the Canadian boreal forest, *Global Change Biology* 17(6): 2084-2094, DOI: 10.1111/j.1365-2486.2010.02357.x
  - Natural Resources Canada, *Changing Climate, Changing Forest Zones*, http://www.nrcan.gc.ca/forests/climate-change/13093
  - Price, D.T., et al. 2013. Anticipating the consequences of climate change for Canada's boreal forest ecosystems, *Environmental Reviews* 21(4): 322–65, DOI: 10.1139/er-2013-0042

Indicator: Wood volume

Sources:

- Canada's National Forest Inventory, Standard Reports, Table 16.1, Total tree volume by species group, age class and terrestrial ecozone in Canada, https://nfi.nfis.org/standardreports.php
- National Forestry Database, Wood supply—National Tables, Table 2.1, Graph C, AAC vs. actual harvest, provincial Crown land—industrial roundwood, 1990–2012, http://nfdp.ccfm.org/supply/national_e.php
- National Forestry Database, Wood supply—National Tables, Table 2.1, Graph B, Wood supply by ownership, latest period calculated, 2012, http://nfdp.ccfm.org/supply/national_e.php

Indicator: Deforestation and afforestation

Source:

- Environment Canada. 2014. *National Inventory Report 1990–2012: Greenhouse Gas Sources and Sinks in Canada*, http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php

Notes:

- Environment Canada, 2014, *National Inventory Report*, based on Natural Resources Canada–Canadian Forest Service's National Forest Carbon Monitoring, Accounting and Report System data and analysis.
- All values reported are for the listed year.
- Forestry numbers result from the creation of permanent forestry access roads.
- Hydroelectric numbers exclude reservoirs. Refer to the indicator text for magnitudes of deforestation due to reservoir flooding.
- Industry and transportation numbers include mines, gravel pits, oil and gas infrastructure, and highway construction.
- Municipal numbers include urban development.
- Recreation numbers include ski hills and golf courses.
- Total numbers are adjusted for rounding.

Indicator: Area harvested

Source:

- National Forestry Database, Silviculture—National Tables, Table 6.2, Area harvested by ownership, harvesting method and province/territory, 1990–2013, http://nfdp.ccfm.org/silviculture/national_e.php

Notes:

- Data include provincial Crown, private and federal forest land subject to even-aged management (clearcutting), uneven-aged management (selection cutting), and commercial thinning harvest methods.
- Graph does not display federal lands because their small area cannot be represented at the given scale.

Indicator: Regeneration

Sources:

- National Forestry Database, Silviculture—National Tables, Table 6.2, Area harvested by ownership, harvesting method, and province/territory, 1990–2013, http://nfdp.ccfm.org/silviculture/national_e.php
- National Forestry Database, Silviculture—National Tables, Table 6.6, Area of direct seeding by ownership and province/territory, 1990–2013, http://nfdp.ccfm.org/silviculture/national_e.php
- National Forestry Database, Silviculture—National Tables, Table 6.7, Area planted by ownership, species, and province/territory, 1990–2013, http://nfdp.ccfm.org/silviculture/national_e.php

Notes:

- Data are for forests on Crown lands across Canada.
- Federally and privately owned lands are excluded.

Indicator: Volume harvested relative to the sustainable wood supply

Source:

- National Forestry Database, Wood Supply—National Tables, Table 2.1, Graph A, Wood supply vs. actual harvest, industrial roundwood, 1970–2012, http://nfdp.ccfm.org/supply/national_e.php

Notes:

- Harvest data include timber harvested for industrial use only and exclude fuel wood and firewood.
- Wood supply data include annual allowable cuts (AAC) for regulated provincial Crown land and potential harvests for federal and private land.

Indicator: Forest diseases

Sources:

- Hutchison, T. 2013. Red band needle blight at ATISC, *Bugs & Diseases* 24(1): 1–2, http://esrd.alberta.ca/lands-forests/forest-health/forest-pests/bugs-diseases/documents/BugsDiseasesNewsletter-Apr2013.pdf
- Laflamme, G. 2013. Spread of *Heterobasidion irregulare* in eastern Canada towards northern natural forests of *Pinus banksiana*. In *Conference Proceedings, IUFRO Working Party 7.02.01 XIII Conference (Root and Butt Rot of Forest Trees)*, pp. 162–63, Florence, Italy, September 4–10, 2011 (Florence, Italy: Firenze University Press).
- Smith, C.M., Shepherd, B., Gillies, C., and Stuart-Smith, J. 2013. Changes in blister rust infection and mortality in whitebark pine over time, *Canadian Journal of Forest Research* 43: 90–96.
- Smith, C.M., Langor, D.W., Myrholm, C., Weber, J., Gillies, C., and Stuart-Smith, J. 2013. Changes in white pine blister rust infection and mortality in limber pine over time, *Canadian Journal of Forest Research* 43: 919–28.
- Woods, A., Coates, K.D., and Hamann, A. 2005. Is an unprecedented Dothistroma needle blight epidemic related to climate change? *BioScience* 55(9): 761–69.

Indicator: Forest insects

Sources:

- National Forestry Database, Forest Insects—National Tables, Table 4.1, Area within which moderate to severe defoliation occurs including area of beetle-killed trees by insects and province/territory, 1975–2013, http://nfdp.ccfm.org/insects/national_e.php
- British Columbia Ministry of Forests, Lands and Natural Resource Operations, *Forest Health Conditions: 2013 Aerial Overview Survey Summary Table*, http://www.for.gov.bc.ca/hfp/health/overview/2013table.htm

Notes:

- Area disturbed by the mountain pine beetle includes only British Columbia.
- Areas include those where there is tree mortality and moderate to severe defoliation. Defoliation does not always imply mortality. For example, stands with moderate defoliation often recover and may not lose much growth. Also, defoliation is mapped on an insect species basis, and a given area may be afflicted by more than one species at a time. This may result in double or triple counting in areas affected by more than one species, exaggerating the extent of the total area defoliated.
- Insect data for 2013 are preliminary only and subject to adjustment.

Indicator: Forest fires

Sources:

- Canadian Interagency Forest Fire Centre. 2013. *Canada Report 2013*, http://www.ciffc.ca/index.php?option=com_content&task=view&id=39&Itemid=180
- National Forestry Database, Forest Fires—National Tables, Table 3.1, Forest fire statistics by province/territory/agency, 1990–2013, http://nfdp.ccfm.org/fires/national_e.php

Indicator: Carbon emissions and removals

Source:

- Environment Canada. 2014. *National Inventory Report 1990–2012: Greenhouse Gas Sources and Sinks in Canada*, http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php

Notes:

- This indicator is estimated annually using Natural Resources Canada–Canadian Forest Service's National Forest Carbon Monitoring, Accounting and Report System. The system integrates information about forest inventories, forest growth, natural disturbances, forest management activities and land-use change to evaluate carbon stocks, stock changes and emissions of non-CO_2 greenhouse gases in Canada's managed forests.
- "Managed land" includes all lands managed for production of wood fibre or wood-based bioenergy, for protection from natural disturbances, or for the conservation of ecological values. Within those managed lands, "forest" includes all areas of 1 hectare or more having the potential to develop forest cover, with a minimum crown closure of 25% and a minimum tree height of 5 metres at maturity in situ.
- Insect-affected areas shown in the figure include only those areas affected with enough severity to have a substantial impact on national forest carbon emissions and removals.
- Current GHG reporting guidelines treat all harvested carbon as an immediate emission in the year the wood is harvested, yet in reality over 50% of this carbon remains stored in houses, long-lived products and landfills, and the use of wood contributes to emission reductions in other sectors by displacing other materials such as concrete, steel and plastics. New reporting guidelines coming into effect in 2015 will more accurately track the fate of carbon stored in harvested wood products, so future emissions estimates will lie somewhere between the two lines in the figure.

How do forests benefit Canadians?

Sources:

- Alliance for Community Trees. 2011. *Benefits of Trees and Urban Forests: A Research List*, http://www.actrees.org/files/Research/benefits_of_trees.pdf
- Health Canada, *Air Pollution and Health*, http://www.hc-sc.gc.ca/ewh-semt/air/out-ext/health-sante/index-eng.php
- Health Canada. 2009. The urban heat island effect: Causes, health impacts and mitigation strategies, *Climate Change and Health—Adaptation Bulletin* 1: 1–2, http://www.hc-sc.gc.ca/ewh-semt/pubs/climat/adapt_bulletin-adapt1/index-eng.php
- Statistics Canada, Labour Force Survey, (special extraction)
- TD Economics. 2014. *Urban Forests: The Value of Trees in the City of Toronto (special report)*, http://www.td.com/document/PDF/economics/special/UrbanForests.pdf

Spotlight: Aboriginal participation in the forest sector

Sources:

- Forest Products Sector Council. 2011. *Conversation and Collaboration: Building the Future Canadian Forest Products Sector with Aboriginal Talent*, http://www.fpac.ca/publications/FPSC-CSPF-Final-English-Report-Conversation-and-Collaboration.pdf
- Forest Products Sector Council. 2011. *Renewing Canada's Greenest Workforce: A Labour Market Intelligence Report*, http://www.fpac.ca/publications/HR_Sector_Renewing_Canadas_Greenest_Workforce_2011.pdf
- National Aboriginal Forestry Association, http://www.nafaforestry.org/

Indicator: Employment

Source:

- Statistics Canada, Labour Force Survey, (special extraction)

Indicator: Average earnings

Sources:

- Statistics Canada, CANSIM Table 281-0027, Average weekly earnings (SEPH), by type of employee for selected industries classified using the North American Industry Classification System (NAICS), http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1
- Statistics Canada, CANSIM Table 380-0102, Gross domestic product indexes, http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1

Notes:

- Additional information can be found at:
  - Natural Resources Canada, *Skilled Trade Shortages—A Regional Issue*, http://cfs.nrcan.gc.ca/selective-cuttings/12
  - Natural Resources Canada, *Industry Overview*, http://www.nrcan.gc.ca/forests/industry/13311
- Data exclude overtime.

Indicator: Contribution of forest products to the gross domestic product

Source:

- Statistics Canada, CANSIM Table 379-0031, Gross domestic product at basic prices, by the North American Industry Classification System (NAICS), http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1

Note:

- CANSIM Table 379-0031 replaces 379-0027 and changes from 2002 dollars to 2007 dollars.

Indicator: Production of forest products

Sources:

- APA, The Engineered Wood Association, Engineered wood statistics, *Quarterly Report*
- Pulp and Paper Products Council
- Statistics Canada, CANSIM Table 303-0064, Lumber production, shipments and stocks, by Canada and provinces, http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1

Note:

- Data used for lumber production include total softwood production for Canada.

Indicator: Exports of forest products

Source:

- Statistics Canada, Merchandise trade data

Note:

- Slight revisions have been made to the set of Harmonized System (HS) Codes used to ensure they align with other federal reports. "Total all forest products" now comprises only HS Codes 44, 47 and 48. "Printing and writing paper" includes three new codes: 480210, 480220 and 480900. The changes affect less than 1% of the trading value in both cases.

Spotlight: Forest sector innovation

Sources:

- Jenkins, T., et al. 2014. *Innovation Canada: A Call to Action, Review of Federal Support to Research and Development – Expert Panel Report*, rd-review.ca/eic/site/033.nsf/eng/h_00287.html
- PricewaterhouseCoopers. 2014. *Fit for the Future, 17th Annual Global CEO Survey: Key Findings in the Forest, Paper and Packaging Industry*, http://www.pwc.com/gx/en/ceo-survey/2014/assets/pwc-17th-annual-global-ceo-survey-forest-paper-packaging-key-findings.pdf

Notes:

- Additional information about Natural Resources Canada's programs can be found at:
  - Natural Resources Canada, *Expanding Market Opportunities Program*, http://www.nrcan.gc.ca/forests/federal-programs/13133
  - Natural Resources Canada, *Forest Innovation Program*, http://www.nrcan.gc.ca/forests/federal-programs/13137
  - Natural Resources Canada, *Investments in Forest Industry Transformation*, http://www.nrcan.gc.ca/forests/federal-programs/13139

Indicator: Financial performance

Source:

- Statistics Canada, *Quarterly Financial Statistics for Enterprises*

Indicator: Secondary manufacturing of forest products

Sources:

- Statistics Canada, CANSIM Table 301-0006, Principal statistics for manufacturing industries, by the North American Industry Classification System (NAICS), http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1
- Statistics Canada, CANSIM Table 301-0003, Annual survey of manufactures (ASM), principal statistics by the North American Industry Classification System (NAICS), incorporated businesses with employees having sales of manufactured goods greater than or equal to $30,000, http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1

Notes:

- Industry Canada defines *value added* as a measure of net output—that is, of gross output less those purchased inputs that have been embodied in the value of the product. See http://www.ic.gc.ca/eic/site/cis-sic.nsf/eng/h_00005.html#v
- CANSIM Table 301-0003 covers value-added data for 1997–2003 for the same industry codes noted below. Due to changes in survey methods and definitions, Tables 301-0006 and 301-0003 data are not entirely consistent. For a summary of the changes, see http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getMainChange&Instald=14033&SurvId=2103&SurvVer=6&SDDS=2103
- CANSIM Table 301-0006 covers value-added data for 2004–2012 for primary wood (NAICS 3211 and 3212), secondary wood (NAICS 3219), primary paper (NAICS 3221), and secondary paper (NAICS 3229). It does not include wood furniture and cabinetry data (NAICS 33711, 337123 and 337213).

Indicator: Forest sector carbon emissions

Sources:

- Natural Resources Canada, *Comprehensive Energy Use Database, 1990 to 2011*, http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/comprehensive_tables/list.cfm?attr=0
- Statistics Canada. 2011. *Report on Energy Supply and Demand in Canada, 2011 Revision*, http://www.statcan.gc.ca/pub/57-003-x/57-003-x2014001-eng.htm

Note:

- The methodology for estimating the amount of primary energy attributed to wood and spent pulping liquor in the pulp and paper sector has been updated, causing changes in the data series between 1995 and 2002. In addition, from 1990 to 2010, wood waste and spent pulping liquor were incorrectly included in other fuels when estimating electricity generation in the *Report on Energy Supply and Demand in Canada*. This has now been corrected for the 2011 data point, but will not be corrected for prior years. These changes have directly affected the estimates for industrial energy use and electricity generation, and indirectly affected the emissions estimates. The time series data for 1990–2011 may therefore not be completely consistent with data for earlier years.

Statistical profiles

Forest inventory

Sources:

Forest area by classification

- Canada's National Forest Inventory, Standard Reports, Table 4.1, Area of forest and non-forest land by terrestrial ecozone in Canada, https://nfi.nfis.org/standardreports.php

Forest area change

- Environment Canada. 2014. *National Inventory Report 1990–2012: Greenhouse Gas Sources and Sinks in Canada*, http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php

Forest type

- Canada's National Forest Inventory, Standard Reports, Table 5.1, Area of forest land by forest type, age class and terrestrial ecozone in Canada, https://nfi.nfis.org/standardreports.php

Growing stock

- Canada's National Forest Inventory, Standard Reports, Table 15.1, Total tree volume on forest land by type, age class, and terrestrial ecozone in Canada, https://nfi.nfis.org/standardreports.php

Forest ownership

- National Forestry Database, Forest Inventory—Background, Ownership, http://nfdp.ccfm.org/inventory/background_e.php#22

Notes:

- *Forest area change* – Environment Canada, 2014, *National Inventory Report*, based on Natural Resources Canada–Canadian Forest Service National Forest Carbon Monitoring, Accounting and Report System data and analysis.
- *Forest area by classification* – The National Forest Inventory uses the following definitions from the Food and Agriculture Organization (FAO) of the United Nations:
  - *Forest land* – areas of land where tree canopies cover more than 10% of the total area and the trees, when mature, can grow to a height of more than 5 metres. Does not include land that is predominantly urban or used for agricultural purposes.
  - *Other land with tree cover* – areas of land where tree canopies cover more than 10% of the total area and the trees, when mature, can grow to a height of at least 5 metres. Includes treed areas on farms, in parks and gardens, and around buildings. Also includes tree plantations established mainly for purposes other than wood production, such as fruit orchards.
  - *Other wooded land* – areas of land where: 1) tree canopies cover 5–10% of the total area and the trees, when mature, can grow to a height above 5 metres; or 2) shrubs, bushes and trees together cover more than 10% of the area. These areas include treed wetlands (swamps) and land with slow-growing and scattered trees. They do not include land that is predominantly agricultural or urban.

Disturbance

Sources:

Insects

- National Forestry Database, Forest Insects—National Tables, Table 4.1, Area within which moderate to severe defoliation occurs including area of beetle-killed trees by insects and province/territory, 1975–2013, http://nfdp.ccfm.org/insects/national_e.php

Fire

- Canadian Interagency Forest Fire Centre. 2013. *Canada Report 2013*, http://www.ciffc.ca/index.php?option=com_content&task=view&id=39&Itemid=180
- National Forestry Database, Forest Fires—National Tables, Table 3.1, Forest fire statistics by province/territory/agency, 1990–2013, http://nfdp.ccfm.org/fires/national_e.php

Notes:

- *Insects* – data include those areas where there is tree mortality and moderate to severe defoliation. Defoliation does not always imply mortality. For example, stands with moderate defoliation often recover and may not lose much growth. Also, defoliation is mapped on an insect species basis, and a given area may be afflicted by more than one species at a time. This may result in double or triple counting in areas affected by more than one species, exaggerating the extent of the total area defoliated.
- *Fire* – data include all burned areas within Canada's forests.

Forest management

Sources:

Harvesting

- National Forestry Database, Silviculture—National Tables, Table 6.2, Area harvested by ownership, harvesting method and province/territory, http://nfdp.ccfm.org/silviculture/national_e.php
- National Forestry Database, Forest Products—National Tables, Table 5.2, Net merchantable volume of roundwood harvested by species group, ownership and province/territory, 1990–2013, http://nfdp.ccfm.org/products/national_e.php

Regeneration

- National Forestry Database, Silviculture—National Tables, Table 6.6, Area of direct seeding by ownership and province/territory, http://nfdp.ccfm.org/silviculture/national_e.php
- National Forestry Database, Silviculture—National Tables, Table 6.7, Area planted by ownership, species and province/territory, http://nfdp.ccfm.org/silviculture/national_e.php

Third-party certification

- Certification Canada, *Certification status – Canada and the globe*, http://www.certificationcanada.org/index.php/english/status_intentions_status

Protected forest

- Canada's National Forest Inventory, Standard Reports, Table 22.1, Area of forest land by IUCN category, and terrestrial ecozone in Canada, https://nfi.nfis.org/standardreports.php

Notes:

- *Harvesting* – the national and provincial/territorial figures for harvesting volume include data for industrial roundwood, fuel wood and firewood.
- *Area planted and seeded* – the total area planted and seeded for Canada includes all federal, provincial and territorial Crown land, and private land.
- *Third-party certification* – if a forest area has been certified to more than one of the three sustainable forest management standards (Canadian Standards Association [CSA], Sustainable Forestry Initiative [SFI], and Forest Stewardship Council [FSC]), the area is counted only once. Therefore, the total certification for sustainable forest management standards may be less than the sum of the individual totals for these standards.

Greenhouse gas inventory

Source:

- Environment Canada. 2014. *National Inventory Report 1990–2012: Greenhouse Gas Sources and Sinks in Canada*, http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/8108.php

Notes:

- Environment Canada, 2014, *National Inventory Report*, based on Natural Resources Canada–Canadian Forest Service's National Forest Carbon Monitoring, Accounting and Report System data and analysis.
- For forest lands affected by land-use change, the deforestation and afforestation figures reflect annual rates. Figures for CO_2 equivalent (CO_2e) emissions and removals reflect the current year plus the previous 20 years. Thus, the figures for CO_2e emissions include residual emissions from areas deforested over the past 20 years, and the figures for CO_2e removals include ongoing removals by areas afforested over the past 20 years.
- Emissions and removals exactly match the most recent greenhouse gas inventory figures submitted to the United Nations Framework Convention on Climate Change. Emissions bear a positive sign. Removals bear a negative sign.

Domestic economic impact

Sources:

Canadian housing starts

- Statistics Canada, CANSIM Table 027-0009, Canada Mortgage and Housing Corporation, housing starts, under construction and completions, all areas, http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1

Contribution to nominal GDP

- NRCan calculations using Statistics Canada, CANSIM Table 379-0031, Gross domestic product (GDP) at basic prices, by the North American Industry Classification System (NAICS), and estimated industry price deflators.

Contribution to real GDP

- Statistics Canada, CANSIM Table 379-0031, Gross domestic product (GDP) at basic prices, by the North American Industry Classification System (NAICS), http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1

Revenue from goods manufactured

- Statistics Canada, CANSIM Table 301-0006, Principal statistics for manufacturing industries, by the North American Industry Classification System (NAICS), http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1
- Statistics Canada, CANSIM Table 301-0006, Principal statistics for manufacturing industries, by the North American Industry Classification System (NAICS), http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1

Notes:

- *Canadian housing starts* – a rate adjustment is used for economic or business data that attempts to remove seasonal variations in the data. The time of year will affect most data. Adjusting for the seasonality in data enables more accurate month-to-month comparisons. The SAAR (seasonally adjusted at annual rate) is calculated by dividing the unadjusted annual rate for the month by its seasonality factor and creating an adjusted annual rate for the month. These adjustments are more often used when economic data are released to the public.
- *Contribution to GDP* – a measure of the economic production that takes place within the geographical boundaries of Canada. Nominal GDP is measured in current dollars and available only for Canada. Current dollars are used to describe the value of production in any given year. Real GDP is measured in 2007 dollars and corrects for inflation, enabling accurate comparisons between years.
- *Revenue from goods manufactured* – includes revenue from the sale of goods manufactured using materials owned by the establishment, as well as from repair work, manufacturing service charges and work contracted to others.

Forest industry employment

Sources:

Employment

- Statistics Canada, Labour Force Survey, (special extraction)
- Statistics Canada, CANSIM Table 281-0023, Employment (SEPH), unadjusted for seasonal variation, by type of employee for selected industries classified by the North American Industry Classification System (NAICS), http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1
- Statistics Canada, CANSIM Table 383-0031, Labour statistics consistent with the System of National Accounts (SNA), by province and territory, job category and the North American Industry Classification System (NAICS), http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1
- Indirect employment is calculated by Natural Resources Canada using Statistics Canada's National Symmetric Input-Output Tables (15-207-XCB) and Statistics Canada's National Multipliers (15F0046XDB).

Wages and salaries

- Statistics Canada, CANSIM Table 301-0006, Principal statistics for manufacturing industries, by the North American Industry Classification System (NAICS), http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1
- Statistics Canada, CANSIM Table 301-0007, Logging industries, principal statistics by the North American Industry Classification System (NAICS), http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1

Notes:

- *Employment* – includes jobs held by people employed directly in the following industries: forestry and logging, industries involved in support activities for forestry, pulp and paper product manufacturing, and wood product manufacturing. Data are sourced from Statistics Canada's Labour Force Survey (LFS) and the Survey of Employment, Payrolls and Hours (SEPH). The LFS data are used to capture the level of self-employment in the forest sector. The SEPH data are used for comparing direct employment in forestry with that in other sectors. The System of National Accounts (SNA) is used by Statistics Canada to assemble all of the relevant data on the Canadian economy into a consistent set of metrics.
- *Wages and salaries* – the earnings, in cash or in kind, of Canadian residents for work performed before deduction of income taxes and contributions to pension funds, employment insurance and other social insurance schemes.

Trade

Source:

- Statistics Canada, Merchandise trade data (special extraction), monthly data

Notes:

- *Balance of trade* – the difference between the value of the goods and services that a country exports and the value of the goods and services that it imports. If a country's exports exceed its imports, it has a trade surplus. If its imports exceed exports, the country has a trade deficit.

Domestic production and investment

Sources:

Production

- Statistics Canada, CANSIM Table 303-0064, Lumber production, shipments and stocks, by Canada and provinces, http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1
- Pulp and Paper Products Council
- APA, The Engineered Wood Association

Capital expenditures and repair expenditures

- Statistics Canada, CANSIM Table 029-0005, Capital and repair expenditures, by sector and province, http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1
- Statistics Canada, CANSIM Table 029-0009, Capital and repair expenditures, industry sectors 31-33, manufacturing, http://www5.statcan.gc.ca/cansim/a01?lang=eng&p2=1

Notes:

- *Production* – production and consumption figures for newsprint, printing and writing paper, and wood pulp are based on Pulp and Paper Products Council data. The production and consumption data of structural panels (plywood and oriented strandboard) are from APA, The Engineered Wood Association.
- *Capital expenditures* – includes the costs of procuring, constructing and installing or leasing new durable plants, machinery and equipment, whether for the replacement of or addition to existing assets. Also included are all capitalized costs, such as costs for feasibility studies and architectural, legal, installation and engineering fees; the value of capital assets put in place by firms, either by contract or with the firm's own labour force; and capitalized interest charges on loans for capital projects.
- *Repair expenditures* – includes costs to repair and maintain structures, machinery and equipment.

Domestic consumption

Source:

- Consumption figures for a range of products, calculated by Natural Resources Canada.

Note:

- This information is available only at the national level.

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What information or section in this year's report was most useful to you?

Which category best describes your affiliation?

- O Provincial/territorial government
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- O General public
- O Industry
- O Education
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